Laser Catheter Placement:

Bjartmarz, H. **Laser Interstitial Thermal Therapy using an Uncooled Laser Catheter in a Diagnostic MR Suite**. *25th Congress of the ESSFN*. Stereotact Funct Neurosurg 2024;102(suppl 1):20, August 15, 2024. doi:10.1159/000539984

Youssef HJ, Dharnipragada R, Chen CC. **The ClearPoint Array Frame: An MRI Compatible System that Supports Non-craniotomy, Multi-trajectory (NCMT) Stereotactic Procedures**. *World Neurosurgery*. 184:e754-e764, April 2024. doi:10.1016/j.wneu.2024.02.029

Singh H, Osswald CR, Rossman A, et al. **Preclinical assessment of a noncooled MR thermometry–based neurosurgical laser therapy system**. *Journal of Neurosurgery*. Published online March 08, 2024. doi:10.3171/2023.12.JNS232154

Wilson H, Dhawan S, Do TH, et al. **The ClearPoint Prism® Laser Ablation System: A New Platform for Laser Interstitial Thermal Therapy (LITT) in Neuro-Oncology**. *Neurosurgery Practice.* 5(1):e00084, March 2024. doi:10.1227/neuprac.0000000000000084

Zagorchev L, Hyde DE, Li C, et al. **Shape-constrained deformable brain segmentation: Methods and quantitative validation**. *NeuroImage*. Volume 289, 2024, 120542, ISSN 1053-8119. doi:10.1016/j.neuroimage.2024.120542

Hamade YJ, Mehrotra A, Chen CC. **Stereotactic needle biopsy and laser ablation of geographically distinct lesions through a novel magnetic resonance imaging-compatible cranial stereotaxic frame: illustrative case.** *J Neurosurg Case Lessons.* 2023;5(2):CASE22448. Published 2023 Jan 9. doi:10.3171/CASE22448

Chen B, Grewal SS, Middlebrooks EH, Tatum WO, et al. **Intraoperative electrocorticography during laser-interstitial thermal therapy predicts seizure outcome in mesial temporal lobe epilepsy.** *Clin Neurophysiol.* 2023;146:118-123. doi:10.1016/j.clinph.2022.12.003

Buch VP, Mirro EA, Purger DA, Zeineh M, et al. **Magnetic resonance imaging–guided laser interstitial thermal therapy for refractory focal epilepsy in a patient with a fully implanted RNS system: illustrative case.** *Journal of Neurosurgery: Case Lessons.* 2022; 3(21), CASE22117. doi:10.3171/CASE22117

Sterk B, Taha B, Osswald C, Bell R, Chen L, Chen CC. **Initial clinical experience with ClearPoint SmartFrame Array®-aided stereotactic procedures.** *World Neurosurg.* 2022;162:e120-e130. doi:10.1016/j.wneu.2022.02.095

Rich CW, Fasano RE, Isbaine F, Saindane AM, et al. **MRI-guided stereotactic laser corpus callosotomy for epilepsy: distinct methods and outcomes.** *Journal of Neurosurgery.* 2021; Published online ahead of print. doi:10.3171/2020.7.JNS20498

Hong CS, Beckta JM, Kundishora AJ, Elsamadicy AA, Chiang VL. **Laser interstitial thermal therapy for treatment of cerebral radiation necrosis.** *International Journal of Hyperthermia.* 2020;37(2):68-76. doi:10.1080/02656736.2020.1760362

Gupta K, Cabaniss B, Kheder A, Gedela S, et al. **Stereotactic MRI-guided laser interstitial thermal therapy for extratemporal lobe epilepsy.** *Epilepsia.* 2020; 00:1-12. doi: 10.1111/epi.16614

*Zervos TM, Scarpace L, Robin AM, Schwalb JM, Air EL. **Adapting to space limitations during prone real-time magnetic resonance imaging-guided stereotaxic laser ablation: Technical pearls.** *Operative Neurosurgery.* 2019;18(4). doi:10.1093/ons/opz173

Bartek J, Alattar A, Jensdottir M, Chen CC. **Biopsy and ablation of H3K27 glioma using skull-mounted Smartframe device: Technical case report.** *World Neurosurgery.* 2019;127:436-441. doi:10.1016/j.wneu.2019.04.029

Ahluwalia M, Barnett GH, Deng D, Tatter SB, et al. **Laser ablation after stereotactic radiosurgery: a multicenter prospective study in patients with metastatic brain tumors and radiation necrosis.** *Journal of Neurosurgery.* 2019;130(3):804-811. doi:10.3171/2017.11.jns171273

Harris M, Steele J, Williams R, Pinkston J, Zweig R, Wilden JA. **MRI-guided laser interstitial thermal thalamotomy for medically intractable tremor disorders.** *Movement Disorders.* 2018;34(1):124-129. doi:10.1002/mds.27545

*Ho AL, Sussman ES, Pendharkar AV, Le S, et al. **Improved operative efficiency using a real-time MRI-guided stereotactic platform for laser amygdalohippocampotomy.** *Journal of Neurosurgery.* 2018;128(4):1165-1172. doi:10.3171/2017.1.jns162046

Larson PS, Vadivelu S, Azmi-Ghadimi H, Nichols A, Fauerbach L, Johnson HB. **Neurosurgical laser ablation and MR thermometry: Risks of multisite workflow pattern.** *Journal of Healthcare Risk Management.* 2017;36(4):7-18. doi:10.1002/jhrm.21258

Rennert RC, Carroll KT, Ali MA, Hamelin T, et al. **Safety of stereotactic laser ablations performed as treatment for glioblastomas in a conventional magnetic resonance imaging suite.** *Neurosurgical Focus.* 2016;41(4). doi:10.3171/2016.8.focus16217

Ali MA, Carroll KT, Rennert RC, Hamelin T, et al. **Stereotactic laser ablation as treatment for brain metastases that recur after stereotactic radiosurgery: a multiinstitutional experience.** *Neurosurgical Focus.* 2016;41(4). doi:10.3171/2016.7.focus16227

*Torcuator RG, Hulou MM, Chavakula V, Jolesz FA, Golby AJ. **Intraoperative real-time MRI-guided stereotactic biopsy followed by laser thermal ablation for progressive brain metastases after radiosurgery.** *Journal of Clinical Neuroscience.* 2016;24:68-73. doi:10.1016/j.jocn.2015.09.008

Mccracken DJ, Willie JT, Fernald BA, Saindane AM, et al. **Magnetic resonance thermometry-guided stereotactic laser ablation of cavernous malformations in drug-resistant epilepsy: Imaging and clinical results.** *Operative Neurosurgery.* 2015;12(1):39-48. doi:10.1227/neu.0000000000001033

Gross RE, Willie JT, Drane DL. **The role of stereotactic laser Amygdalohippocampotomy in Mesial temporal lobe epilepsy.** *Neurosurgery Clinics of North America.* 2016;27(1):37-50. doi:10.1016/j.nec.2015.08.004

*Gross RE, Willie JT. **Response to journal club: Real-time magnetic resonance-guided stereotactic laser Amygdalohippocampotomy for Mesial Temporal Lobe Epilepsy.** *Neurosurgery.* 2015;77(3). doi:10.1227/neu.0000000000000876

Drane DL, Loring DW, Voets NL, Price M, et al. **Better object recognition and naming outcome with MRI-guided stereotactic laser amygdalohippocampotomy for temporal lobe epilepsy.** *Epilepsia.* 2014;56(1):101-113. doi:10.1111/epi.12860

Willie JT, Tung JK, Gross RE. **Chapter 16: MRI-guided stereotactic laser ablation.** *Image-Guided Neurosurgery.* 2015:375-403. doi:10.1016/b978-0-12-800870-6.00016-9

*Willie JT, Laxpati NG, Drane DL, Gowda A, et al. **Real-time magnetic resonance-guided stereotactic laser Amygdalohippocampotomy for Mesial Temporal Lobe Epilepsy.** *Neurosurgery.* 2014;74(6):569-585. doi:10.1227/neu.0000000000000343

DBS Lead Placement:

Yearley AG, Chua M, Horn A, Cosgrove GR, Rolston JD. **Deep Brain Stimulation Lead Localization Variability Comparing Intraoperative MRI Versus Postoperative Computed Tomography** [published online ahead of print, 2023 Aug 16]. *Oper Neurosurg (Hagerstown)*. 2023;10.1227/ons.0000000000000849. doi:10.1227/ons.0000000000000849

Harland TA, Brougham J, Gupta S, Strahan J, Hefner M, Wilden J. **A Modified Technique for Interventional MRI-Guided Deep Brain Stimulation Using the ClearPoint System.** *Oper Neurosurg (Hagerstown).* 2023;25(1):81-86. doi:10.1227/ons.0000000000000698

Lee AT, Han KJ, Nichols N, Sudhakar VR, Burke JF, Wozny TA, Chung JE, Volz MM, Ostrem JL, Martin AJ, Larson PS, Starr PA, Wang DD. **Targeting Accuracy and Clinical Outcomes of Awake Vs Asleep Interventional MRI-Guided Deep Brain Stimulation for Parkinson's Disease: The UCSF Experience.** *Neurosurgery. 2022 Sep 7.* Epub ahead of print. PMID: 36069560. doi:10.1227/neu.0000000000002111

The information presented in this article is a scientific and medical discussion of a peer reviewed journal article presenting data from a retrospective, non-randomized study describing DBS techniques. Certain authors of this study received non-financial research support from ClearPoint Neuro during the time period of the study.

Burdette DE, Haykal MA, Jarosiewicz B, Fabris RR, et al. **Brain-responsive corticothalamic stimulation in the centromedian nucleus for the treatment of regional neocortical epilepsy.** *Epilepsy & Behavior.* 2020;112. doi:10.1016/j.yebeh.2020.107354

Gummadavelli A, Zaveri HP, Spencer DD, Gerrard JL. **Expanding brain–computer interfaces for controlling epilepsy networks: Novel thalamic responsive neurostimulation in refractory epilepsy.** *Frontiers in Neuroscience.* 2018;12:474. doi:10.3389/fnins.2018.00474

Martin AJ, Larson PS, Ziman N, Levesque N, et al. **Deep brain stimulator implantation in a diagnostic MRI suite: infection history over a 10-year period.** *Journal of Neurosurgery.* 2017;126(1):108-113. doi:10.3171/2015.7.jns15750

Lahue SC, Ostrem JL, Galifianakis NB, Luciano MS, et al. **Parkinson's disease patient preference and experience with various methods of DBS lead placement.** *Parkinsonism & Related Disorders.* 2017;41:25-30. doi:10.1016/j.parkreldis.2017.04.010

Sidiropoulos C, Rammo R, Merker B, Mahajan A, et al. **Intraoperative MRI for deep brain stimulation lead placement in Parkinson's disease: 1 year motor and neuropsychological outcomes.** *Journal of Neurology.* 2016;263(6):1226-1231. doi:10.1007/s00415-016-8125-0

Chansakul T, Chen PN, Lee TC, Tierney T. **Interventional MR imaging for deep brain stimulation electrode placement.** *Radiology.* 2016;281(3):940-946. doi:10.1148/radiol.2015151136

Rolston JD, Englot DJ, Starr PA, Larson PS. **An unexpectedly high rate of revisions and removals in deep brain stimulation surgery: Analysis of multiple databases.** *Parkinsonism & Related Disorders.* 2016;33:72-77. doi:10.1016/j.parkreldis.2016.09.014

Azmi H, Gupta F, Vukic M, Kreitner J, et al. **Interventional magnetic resonance imaging-guided subthalamic nucleus deep brain stimulation for Parkinson's disease: Patient selection.** *Surgical Neurology International.* 2016;7(20):557. doi:10.4103/2152-7806.187537

Southwell DG, Narvid JA, Martin AJ, Qasim SE, Starr PA, Larson PS. **Comparison of deep brain stimulation lead targeting accuracy and procedure duration between 1.5- and 3-Tesla interventional magnetic resonance imaging systems: An initial 12-month experience.** *Stereotactic and Functional Neurosurgery.* 2016;94(2):102-107. doi:10.1159/000443407

Ostrem JL, Ziman N, Galifianakis NB, Starr PA, et al. **Clinical outcomes using ClearPoint interventional MRI for deep brain stimulation lead placement in Parkinson's disease.** *Journal of Neurosurgery.* 2016;124(4):908-916. doi:10.3171/2015.4.jns15173

Larson PS, et al. (2016). **Interventional MRI-Guided DBS: A Practical Atlas**. This book is available for download with iBooks on your Mac or iOS device: https://books.apple.com/us/book/interventional-mri-guided-dbs/id554568402

Sidiropoulos C, Mubita L, Krstevska S, Schwalb JM. **Successful Vim targeting for mixed essential and parkinsonian tremor using intraoperative MRI.** *Journal of the Neurological Sciences.* 2015;358(1-2):488-489. doi:10.1016/j.jns.2015.08.1553

Chabardes S, Isnard S, Castrioto A, Oddoux M, et al. **Surgical implantation of STN-DBS leads using intraoperative MRI guidance: technique, accuracy, and clinical benefit at 1-year follow-up.** *Acta Neurochirurgica.* 2015;157(4):729-737. doi:10.1007/s00701-015-2361-4

Ivan ME, Yarlagadda J, Saxena AP, Martin AJ, et al. **Brain shifts during burr hole–based procedures using interventional MRI.** *Journal of Neurosurgery.* 2014;121(1):149-160. doi:10.3171/2014.3.jns121312

Starr PA, Markun LC, Larson PS, Volz MM, Martin AJ, Ostrem JL. **Interventional MRI–guided deep brain stimulation in pediatric dystonia: first experience with the ClearPoint system.** *Journal of Neurosurgery: Pediatrics.* 2014;14(4):400-408. doi:10.3171/2014.6.peds13605

Vega RA, Holloway KL, Larson PS. **Image-guided deep brain stimulation.** *Neurosurgery Clinics of North America.* 2014;25(1):159-172. doi:10.1016/j.nec.2013.08.008

Sillay KA, Rusy D, Buyan-Dent L, Ninman NL, Vigen KK. **Wide-bore 1.5T MRI-guided deep brain stimulation surgery: initial experience and technique comparison.** *Clinical Neurology and Neurosurgery.* 2014;127:79-85. doi:10.1016/j.clineuro.2014.09.017

Larson PS, Starr PA, Ostrem JL, Galifianakis N, Palenzuela MSL, Martin A. **Application accuracy of a second generation interventional MRI stereotactic platform.** *Neurosurgery.* 2013;60:187. doi:10.1227/01.neu.0000432793.68257.ab

Ostrem J, Galafianakis N, Markum L, Grace JK, et al. **Clinical outcomes of PD patients having bilateral STN DBS using high-field interventional MR-imaging for lead placement.** *Clinical Neurology and Neurosurgery.* 2013;115(6):708-712. doi:10.1016/j.clineuro.2012.08.019

Larson PS, Starr PA, Bates G, Tansey L, et al. **An optimized system for interventional magnetic resonance imaging-guided stereotactic surgery: preliminary evaluation of targeting accuracy.** *Neurosurgery.* 2012 Mar;70(1 Suppl Operative):95-103; discussion 103. doi: 10.1227/NEU.0b013e31822f4a91

Biopsy:

Sanchez-Garavito E, Iyer H, Perez-Vega C, et al. **Revolutionizing Brain Biopsies: The ClearPoint-Guided Technique: Technical Insights and Initial Mayo Clinic Experience**. *J Neurol Surg B Skull Base.* 2025; 86(S 01): S1-S576. Published online before print: February 07, 2025. doi:10.1055/s-0045-1803870

Wilson H, Dhawan S, Do TH, et al. **The ClearPoint Prism® Laser Ablation System: A New Platform for Laser Interstitial Thermal Therapy (LITT) in Neuro-Oncology**. *Neurosurgery Practice.* 5(1):e00084, March 2024. doi:10.1227/neuprac.0000000000000084

Zagorchev L, Hyde DE, Li C, et al. **Shape-constrained deformable brain segmentation: Methods and quantitative validation**. *NeuroImage*. Volume 289, 2024, 120542, ISSN 1053-8119. doi:10.1016/j.neuroimage.2024.120542

Dhawan S, Chen CC. **Comparison meta-analysis of intraoperative MRI-guided needle biopsy versus conventional stereotactic needle biopsies**. *Neurooncol Adv*. 2023;6(1):vdad129. Published 2023 Oct 10. doi:10.1093/noajnl/vdad129

Ling AL, Solomon IH, Landivar AM, et al. **Clinical trial links oncolytic immunoactivation to survival in glioblastoma**. *Nature 623*. 157–166 (2023). doi:10.1038/s41586-023-06623-2

Dhawan S, Chen CC. **Comparison meta-analysis of intra-operative MRI-guided needle biopsy versus conventional stereotactic needle biopsies**. *Neuro-Oncology Advances*. 2023;vdad129. doi:10.1093/noajnl/vdad129

Cruz-Garza JG, Taghlabi KM, Bhenderu LS, Gupta S, et al. **Magnetic Resonance-Guided Stereotaxy for Infusions to the Pig Brain**. *JoVE Journal Neuroscience*. Published online: 31 March 2023. doi:10.3791/64079-v

Hamade YJ, Mehrotra A, Chen CC. **Stereotactic needle biopsy and laser ablation of geographically distinct lesions through a novel magnetic resonance imaging-compatible cranial stereotaxic frame: illustrative case.** *J Neurosurg Case Lessons.* 2023;5(2):CASE22448. Published 2023 Jan 9. doi:10.3171/CASE22448

Taha BR, Osswald CR, Rabon M, Garcia CS, et al. **Learning Curve Associated with ClearPoint Neuronavigation System: A Case Series.** *World Neurosurgery: X.* 2022;13: 100115. doi:10.1016/j.wnsx.2021.100115

Bartek J Jr, Alattar A, Jensdottir M, Chen CC. **Biopsy and ablation of H3K27 glioma using skull-mounted Smartframe Device: Technical case report.** *World Neurosurgery.* 2019;127:436–441. doi:10.1016/j.wneu.2019.04.029

Carroll KT, Lochte BC, Chen JY, Snyder VS, Carter BS, Chen CC. **Intraoperative magnetic resonance imaging-guided biopsy in the diagnosis of Suprasellar Langerhans Cell Histiocytosis.** *World Neurosurgery.* 2018;112:6–13. doi:10.1016/j.wneu.2017.12.184

Mohyeldin A & Elder JB. **Stereotactic biopsy platforms with intraoperative imaging guidance.** *Neurosurgery Clinics of North America.* 2017;28(4):465–475. doi:10.1016/j.nec.2017.05.002

*Scheer JK, Hamelin T, Chang L, Lemkuil B, Carter BS, Clark CC. **Real-time magnetic resonance imaging-guided biopsy using SmartFrame® stereotaxis in the setting of a conventional diagnostic magnetic resonance imaging suite.** *Operative Neurosurgery.* 2017;13(3):329–337. doi:10.1093/ons/opw035

*Torcuator RG, Hulou MM, Chavakula V, Jolesz FA, Golby AJ. **Intraoperative real-time MRI-guided stereotactic biopsy followed by laser thermal ablation for progressive brain metastases after radiosurgery.** *Journal of Clinical Neuroscience.* 2016;24:68–73. doi:10.1016/j.jocn.2015.09.008

*Mohyeldin A, Lonser RR, Elder JB. **Real-time magnetic resonance imaging-guided frameless stereotactic brain biopsy: technical note.** *Journal of Neurosurgery.* 2016;124(4):1039–1046. doi:10.3171/2015.5.JNS1589

Drug Delivery: (*For scientific information purposes only; Therapies discussed may not be approved in all geographies or may be investigational and used only in pre-clinical and clinical studies.*)

Zagorchev L, Wenzel F, Gooßen A, Fläschner N, Li C, Hyde DE, Cerny A, et al. **Model-based rigid and nonrigid volumetric image registration for image-guided interventions**. *Int J CARS*. Published online before print: April 28, 2026. doi:10.1007/s11548-026-03639-7

Terzic B, Melin E, Fagergren P, Dobry D, et al. **AAV-mediated gene therapy for focal epilepsy by expressing neuropeptide Y and Y2 receptor in rodent and non-human primate hippocampus**. *Molecular Therapy*. Volume 33, Issue 9, 4239-4258. September 03, 2025. doi:10.1016/j.ymthe.2025.06.019

Elder JB, Carter B, Larson PS, Dalm B, et al. **Direct delivery of gene- and cell-based therapies to the nervous system. Image-Guided Biologic Therapies: Neurosurgeons Innovating Treatment Excellence Summit summary**. *Journal of Neurosurgery*. Published online before print: June 06,2025. doi:10.3171/2025.1.JNS241967

Van Laar AD, Christine CW, Phielipp N, Larson PS, et al. **Intraputaminal Delivery of Adeno-Associated Virus Serotype 2–Glial Cell Line–Derived Neurotrophic Factor in Mild or Moderate Parkinson's Disease**. *Mov Disord*. Volume 40, Issue 7, 1297-1306. Published online before print: May 20, 2025. doi:10.1002/mds.30193

Tarbar V, Sarva H, Lozano AM, et al. **Phase I trial of hES cell-derived dopaminergic neurons for Parkinson's disease**. *Nature*. Volume 21, Issue 4, 2024, e00434, ISSN 1878-7479. Published online April 16, 2025. doi:10.1038/s41586-025-08845-y

Ramachandran S, Ardinger J, Bu J, Ramos M, et al. **AAV-mediated ARSA replacement for the treatment of Metachromatic Leukodystrophy**. *bioRxiv*. Published online March 13, 2024. doi:10.1101/2025.03.12.642609

Sanchez-Garavito E, Iyer H, Perez-Vega C, et al. **Revolutionizing Brain Biopsies: The ClearPoint-Guided Technique: Technical Insights and Initial Mayo Clinic Experience**. *J Neurol Surg B Skull Base.* 2025; 86(S 01): S1-S576. Published online before print: February 07, 2025. doi:10.1055/s-0045-1803870

Ruchit PV, Nanda P, Richardson RM. **Neurosurgical gene therapy for central nervous system disease**. *Neurotherapeutics*. Volume 21, Issue 4, 2024, e00434, ISSN 1878-7479. Published online August 26, 2024. doi:10.1016/j.neurot.2024.e00434

Emborg ME, Mancinelli A, Colwell JC, Zinnen AD, et al. **Preclinical evaluation of transaxial intraputaminal trajectory for enhanced distribution of grafted cells in Parkinson's disease**. *Journal of Neurosurgery*. Published online July 26, 2024. doi:10.3171/2024.4.JNS24367

Zagorchev L, Hyde DE, Li C, et al. **Shape-constrained deformable brain segmentation: Methods and quantitative validation**. *NeuroImage*. Volume 289, 2024, 120542, ISSN 1053-8119. doi:10.1016/j.neuroimage.2024.120542

Qiu L, Xu E, Chambule S, LaTourette P, Dyer CD, et al. **Magnetic Resonance Imaging–Guided Frameless Stereotactic Injections of the Bilateral Cerebellar Dentate Nuclei in Nonhuman Primates: Technical Note**. *Operative Neurosurgery*. 10.1227/ons.0000000000001050, February 1, 2024. doi:10.1227/ons.0000000000001050

Blum D, Babu H, Beach R, et al. **First-in-Human Trial of NRTX-1001 GABAergic Interneuron Cell Therapy for Treatment of Focal Epilepsy - Emerging Clinical Trial Results**. *In: Proceedings from the American Epilepsy Society*. December 1-5, 2023; Orlando, FL. Abstract 2.306

François-Heude MC, Poulen G, Flamand Roze E, et al. **Intraputaminal Gene Delivery in Two Patients with Aromatic L-Amino Acid Decarboxylase Deficiency**. *Mov Disord Clin Pract*. 2023;10(5):811-818. Published 2023 Feb 24. doi:10.1002/mdc3.13685

Pino IP, Darrow DP, Chen CC. **MRI-aided SmartFlow convection delivery of DNX-2401: a pilot, prospective case series**. *World Neurosurgery.* 2023, ISSN 1878-8750. doi:10.1016/j.wneu.2023.10.142

The ClearPoint system enables intraprocedural MRI guidance for a number of neurological therapies and approved clinical trials.

Ford MM, George BE, Van Laar VS, et al. **GDNF gene therapy for alcohol use disorder in male non-human primates**. *Nat Med.* 29, 2030–2040 (2023). doi:10.1038/s41591-023-02463-9

Salegio E, Hancock K, Korszen S. **Pre-Clinical Delivery of Gene Therapy Products into the Cerebrospinal Fluid: Challenges and Considerations for Clinical Translation**. *Front. Mol. Neurosci. Sec. Brain Disease Mechanisms*. Vol. 16 – 2023. doi:10.3389/fnmol.2023.1248271

Cruz-Garza JG, Taghlabi KM, Bhenderu LS, Gupta S, et al. **Magnetic Resonance-Guided Stereotaxy for Infusions to the Pig Brain**. *JoVE Journal Neuroscience*. Published online: 31 March 2023. doi:10.3791/64079-v

Compton DR, DeMarco SJ, Yalamanchili P. **AAV2-hAADC (Eladocagene Exuparvovec) Biodistribution and Expression: Superiority of Intraputaminal versus Intracerebroventricular and Intrathecal (Lumbar) Routes of Administration**. *International Journal of Toxicology*. 2023;42(2):135-145. doi:10.1177/10915818221144424

Compton DR, DeMarco SJ, Yalamanchili P. **Supplemental Material – AAV2-hAADC (Eladocagene Exuparvovec) Biodistribution and Expression: Superiority of Intraputaminal versus Intracerebroventricular and Intrathecal (Lumbar) Routes of Administration**. *SAGE Journals*. Journal contribution posted 2022-12-06. doi.org/10.25384/SAGE.21685655.v1

Keam SJ. **Eladocagene Exuparvovec: First Approval**. *Drugs (2022)*. Published online: 14 September 2022. doi:10.1007/s40265-022-01775-3

Salegio EA, Cukrov M, Lortz R, Green A, et al. **Feasibility of Targeted Delivery of AAV5-GFP into the Cerebellum of Nonhuman Primates Following a Single Convection-Enhanced Delivery Infusion.** *Human Gene Therapy.* 2022;3: Epub ahead of print. doi:10.1089/hum.2021.163

Keiser MS, Ranum PT, Yrigollen CM, Carrell EM, et al. **Toxicity after AAV delivery of RNAi expression constructs into nonhuman primate brain.** *Nature Medicine.* 2021;27:1982-1989. doi:10.1038/s41591-021-01522-3

Pearson TS, Gupta N, Sebastian WS, Imamura-Ching J, et al. **Gene therapy for aromatic L-amino acid decarboxylase deficiency by MR-guided direct delivery of AAV2-AADC to midbrain dopaminergic neurons.** *Nature Communications.* 2021;12, 4251. doi:10.1038/s41467-021-24524-8

Rossmeisl JH, Herpai D, Quigley M, Cecere TE, et al. **Phase I trial of convection-enhanced delivery of IL13RA2 and EPHA2 receptor targeted cytotoxins in dogs with spontaneous intracranial gliomas.** *Neuro-Oncology.* 2021;23(3):422-434. doi:10.1093/neuonc/noaa196

Bander ED, Ramos AD, Wembacher-Schroder E, Ivasyk I, et al. **Repeat convection-enhanced delivery for diffuse intrinsic pontine glioma.** *Journal of Neurosurgery.* 2020;26(6):661-667. doi:10.3171/2020.6.PEDS20280

Buttery PC, Barker RA. **Gene and cell-based therapies for Parkinson's disease: Where are we?** *Neurotherapeutics.* 2020;17:1539-1562. doi:10.1007/s13311-020-00940-4

Taghian T, Horn E, Shazeeb MS, Bierfeldt LJ, et al. **Volume and infusion rate dynamics of intraparenchymal central nervous system infusion in a large animal model.** *Human Gene Therapy.* 2020;31(11-12):617-625. doi:10.1089/hum.2019.288

Nutt JG, Curtze C, Hiller A, Anderson S, et al. **Aromatic L-Amino acid decarboxylase gene therapy enhances levodopa response in Parkinson's disease.** *Movement Disorders.* 2020;35(5):851-858. doi:10.1002/mds.27993

Richardson MR, Bankiewicz KS, Chadwick CW, Van Laar AD, et al. **Data-driven evolution of neurosurgical gene therapy delivery in Parkinson's disease.** *Journal of Neurology, Neurosurgery, & Psychiatry.* 2020. doi:10.1136/jnnp-2020-322904

Souweidane MM, Tosi U. **Convection enhanced delivery for diffuse intrinsic pontine glioma: Review of a single institution experience.** *Pharmaceutics.* 2020;12(660). doi:10.3390/pharmaceutics12070660

Chadwick CW, Bankiewicz KS, Van Laar AD, Richardson MR, et al. **Magnetic resonance imaging–guided phase 1 trial of putaminal AADC gene therapy for Parkinson's disease.** *Annals of Neurology.* 2019;85:704–714. doi:10.1002/ana.25450

Salegio EA, Campagna MV, Allen PC, Stockinger DE, Song Y, Hwa GC. **Targeted delivery and tolerability of MRI-guided CED infusion into the cerebellum of nonhuman primates.** *Human Gene Therapy Methods.* 2018;29(4). doi:10.1089/hgtb.2018.049

Talbott JF, Cooke DL, Mabray MC, Larson PS, et al. **Accuracy of image-guided percutaneous injection into a phantom spinal cord utilizing flat panel detector CT with MR fusion and integrated navigational software.** *Journal of NeuroInterventional Surgery.* 2018;10(12). doi:10.1136/neurintsurg-2018-013878

Jahangiri A, Chin AT, Flanigan PM, Chen R, Bankiewicz KS, Aghi MK. **Convection-enhanced delivery in glioblastoma: a review of preclinical and clinical studies.** *Journal of Neurosurgery.* 2017;126(1):191–200. doi:10.3171/2016.1.JNS151591

Vasconcellos E, Wembacher-Schroder E, Thomson R, Rube M, Souweidane M. **A flexible step design infusion catheter for prolonged drug delivery into the brain stem of children.** *Neuro-Oncology.* 2016;18(3):iii128. doi:10.1093/neuonc/now078.08

*Han SJ, Bankiewicz K, Butowski NA, Larson PS, Aghi MK. **Interventional MRI-guided catheter placement and real time drug delivery to the central nervous system.** *Expert Review of Neurotherapeutics.* 2016;16(6):635–639. doi:10.1080/14737175.2016.1175939

Rowland NC, Kalia SK, Kalia LV, Larson PS, et al. **Merging DBS with viral vector or stem cell implantation: "Hybrid" stereotactic surgery as an evolution in the surgical treatment of Parkinson's disease.** *Molecular Therapy Methods & Clinical Development.* 2016;3:15051. doi:10.1038/mtm.2015.51

Vogelbaum MA & Aghi MK. **Convection-enhanced delivery for the treatment of glioblastoma.** *Neuro-Oncology.* 2015;7(2):ii3-ii8. doi:10.1093/neuonc/nou354

Chittiboina P, Heiss JD, Lonser RR. **Accuracy of direct magnetic resonance imaging-guided placement of drug infusion cannulae.** *Journal of Neurosurgery.* 2015;122(5):1173–1179. doi:10.3171/2014.11.JNS131888

Silvestrini MT, Yin D, Martin AJ, Coppes VG, et al. **Interventional magnetic resonance imaging-guided cell transplantation into the brain with radially branched deployment.** *Molecular Therapy Methods & Clinical Development.* 2015;23(1):119–129. doi:10.1038/mt.2014.155

Richardson MR, Kells AP, Martin AJ, Larson PS, et al. **Novel platform for MRI-guided convection-enhanced delivery of therapeutics: preclinical validation in nonhuman primate brain.** *Stereotactic and Functional Neurosurgery.* 2011;89(3):141–151. doi:10.1159/000323544

Richardson MR, Kells AP, Rosenbluth KH, Salegio EA, et al. **Interventional MRI-guided putaminal delivery of AAV2-GDNF for a planned clinical trial in Parkinson's disease.** *Molecular Therapy.* 2011;19(6):1048–1057. doi:10.1038/mt.2011.11

**The ClearPoint Navigation System enables intraprocedural MRI guidance for a number of neurological therapies and approved clinical trials.*

ClearPoint Neuro, Inc. Indications for Use (K142505): *The ClearPoint® System is intended to provide stereotactic guidance for the placement and operation of instruments or devices during planning and operation of neurological procedures within the MRI environment and in conjunction with MR imaging. The ClearPoint System is intended as an integral part of procedures that have traditionally used stereotactic methodology. These procedures include biopsies, catheter and electrode insertion including deep brain stimulation (DBS) lead placement. The System is intended for use only with 1.5 and 3.0 Tesla MRI scanners and MR Conditional implants and devices. The user should consult the "Navigational Accuracy" section of the User's Guide to assess if the accuracy of the system is suitable for their needs.*

The SmartFlow® Neuro Cannula *has received 510(k) clearance from the FDA for use in the US for the aspiration of CSF, injection of the chemotherapy drug Cytarabine into the ventricles, or delivery of the gene therapy KEBILIDI to the brain parenchyma. It has also been CE marked for use in Europe for the delivery of approved fluids into the brain during intracranial procedures, or aspiration of CSF with the 14ga cannulas. The device is not intended for implant and is single patient use.*

The ClearPoint Prism® Neuro Laser Therapy System *is compatible with the following 1.5T and 3.0T MR scanner systems: Siemens MRI Magnetom and GE MRI Signa. When interpreted by a trained physician, this device provides information that may be useful in the determination or assessment of thermal therapy. Patient management decisions should not be made solely on the basis of analysis using the ClearPoint Prism® Neuro Laser Therapy System.*