

Allina Health 

2021

Annual Report

Neuroscience Research Department


The Neuroscience Research Mission

The mission Allina Health Neuroscience Research Department is to advocate and advance neuroscience research across numerous clinical programs with the goal of improving patient care. Together, we strive to promote, foster, and sustain the highest quality research while developing methods to enhance care, manage side effects, and improve the cost-effectiveness of treatment modalities.

2021 Neuroscience Research

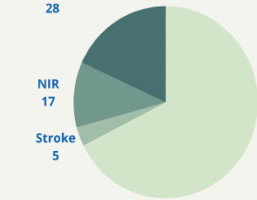
An overview of Neuroscience Research accomplishments.

ADDED NEW STAFF
8 new researchers were added to the Neuroscience Team

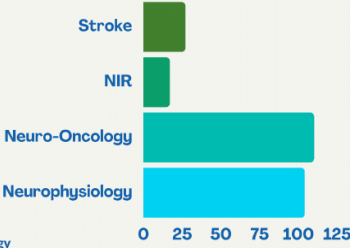


PATIENTS SERVED


154 Patients were enrolled in 2021




238 Patients' records were used in Research Projects



2021 STUDIES
40 studies were active across all Neuroscience Research groups




INVESTIGATORS
13 individuals served as Principal Investigators on Research Projects in 2021 - with two doing so for the first time!



PUBLICATIONS & PRESENTATIONS

In 2021, Neuroscience Research had 22 publications, 13 presentations, and 2 book chapters



2021 Updates

The goal of the Allina Neuroscience Research Department is to provide complete research support services to all individuals affiliated with Neuroscience Clinical Programs at Allina Health that are interested in developing research projects that will lead to improvements in the prevention, diagnosis, and treatment of neurological diseases. Some of these support services include:

- Assistance with research project development and design
- Assistance with completion of IRB documents
- Research grant preparation and budgetary management
- Database development and management
- Biostatistician support
- Poster and slide preparation for scientific presentation
- Clinical trial operations and regulatory management

In 2021, highlights of the Neuroscience Research Program include:

- A total of 8 new studies were begun, with 5 clinical trials and 3 investigator-initiated projects
- 40 studies were active across all Neuroscience sections (14 Neuro-Oncology, 2 Neurophysiology, and 24 Neurovascular/Stroke)
- Department Standard Operating Procedures were reviewed and updated, and new staff onboard procedures were developed
- A total of 154 patients were enrolled in studies from January-December 2021
- Data was abstracted from a total of 238 patient's records for research purposes
- Dr. Asaithambi assumed the role of System Medical Director of Acute Inpatient Stroke
- The Internship program for undergraduates, which attracts national applicants, was continued
- Sarah Pederson, MA, MBA joined the Neuroscience Research team as interim Director.
- Ellory Wolin joined the Neuroscience Research team as a Research Project Specialist
- Katrina Stremski, RN, PHN, MN, MA joined the Neuroscience Research Team as a Research Nurse
- Kaitlin Lundell, MPH joined the Neuroscience Research team as a Research Project Specialist
- Jennifer Murwin, MLS^(CM) joined the Neuroscience team as a Research Project Specialist
- Marie Meyer, MA, CCC-SLP joined the Neuroscience Research Team as a Research Project Specialist
- Terri Proulx, ACRP-CP joined the Neuroscience Research Team as a Regulatory Specialist
- Kelly Featherstone-Sood, RN, BSN, PHN joined the Neuroscience Research Team as a Research Nurse

Selected Study Synopses

Dose Responsiveness as a Measure of Clinical Effectiveness During Neuromonitored Spine Surgery

Principal Investigator: Stanley A. Skinner, MD; Co-Investigator: Jeffrey A. Strommen, MD

Intraoperative neurophysiological monitoring (IONM) measures neural function and integrity during surgical procedures, allowing the surgical team to take immediate and corrective actions to prevent a bad outcome. ANW's IONM department, recognized for its creation of national standards, remains committed to improved clinical outcomes through innovation. *Dose responsiveness as a measure of clinical effectiveness during neuromonitored spine surgery* is an observational research study using a prospective neuromonitoring database to enhance the evidence-base for IONM.



The study examines two dose effect measures to evaluate the IONM evidence base: dose effect of intraoperative injury and dose effect of IONM testing frequency. Additionally, patient-reported outcomes are evaluated longitudinally in conjunction with clinical outcomes data through 12 months post-operatively. Since December 2020, 127 patients undergoing cervical and thoracic extradural spine surgery (spinal cord level) at ANW have been included in this prospective database study after providing informed consent. 11 participants have completed all longitudinal measures. We aim to include 300 participants, continuing enrollment through 2023. Expanding the IONM evidence base allows for improved value-based decisions on how IONM is ordered and how it should be executed during spinal surgery. Hence, the results generated from this study will help us learn more about predicting outcomes for people who have monitoring during their surgery, and will help us to fine-tune our IONM protocols.

Conivaptin for the Reduction of Cerebral Edema in Intercerebral Hemorrhage – Comparison of Perihematomal Edema Volumes to Historical Control

Principal Investigator: Dr. Jesse Corry

Intracerebral hemorrhage (ICH) represents ~10-15% of all strokes in the United States. With 30-day mortality around 40%, ICH can be further complicated by the development of cerebral edema (CE). The Neuroscience Research team at United Hospital previously conducted a Phase I trial to determine the feasibility of early conivaptan use in patients with CE from ICH and intracerebral pressure (ICP).

Conivaptin for the Reduction of Cerebral Edema in Intracerebral Hemorrhage – Comparison of Perihematomal Edema Volumes to Historical Control aims to compare data from the previous study, with a historically matched control to establish if changes in the volume and onset of perihematomal edema (PHE) occurred with conivaptan use. Our team has performed a retrospective chart review for 21 ICH patients hospitalized at United Hospital between August 2014 and December 2019. These historically matched control cases will be compared to the 7 conivaptin trial patients. This study aims to show that the frequent and early use of conivaptan

reduces CE in patients with ICH, and delays the onset of PHE. This study also examines the feasibility of future phases of this investigation, requiring an Investigational New Drug application for conivaptan.

STRIP Registry: Stroke Thromboembolism Registry of Imaging and Pathology

Principal Investigator: Dr. Jossier Delgado

The STRIP Registry is a research project which involves Allina's participation as a site in a multicenter study analyzing clots retrieved during mechanical thrombectomy procedures for the treatment of acute ischemic stroke. Patients will be undergoing mechanical thrombectomy as part of the standard of care for treatment of their stroke, which seeks to remove blood clots from the vessels of the brain to facilitate normal flow and cure stroke. In this study, clots are retrieved and shipped out to the Central Site for analysis. This analysis aims to: characterize the histopathologic features of the clots; examine the correlation between clot histology and success/ease of the mechanical thrombectomy procedure; and study the association between device selection, clot subtype, and outcome.

Since the study began in June 2018, 119 individuals have been enrolled in the study. In 2021, 17 individuals were enrolled and had their clots retrieved and shipped to the central site for analysis. As our site approaches the enrollment cap of 150 participants, we expect completion of this study to occur in the somewhat near future. Once this study is complete, the Neuroscience Research Team anticipates possible participation in an expanded project to further investigate the features and treatment of Acute Ischemic Stroke using mechanical thrombectomy.

A Randomized, Double-Blind, Placebo-Controlled Phase 3 Study of Enzastaurin Added to Temozolomide During and Following Radiation Therapy in Newly Diagnosed Glioblastoma Patients Who Possess the Novel Genomic Biomarker DGM1

Principal Investigator: Dr. John Trusheim

This Phase 3 study seeks to enroll patients with newly diagnosed glioblastoma. The study sponsor has identified a unique biomarker, DGM1, which appears to be related to a positive response to the investigational medication, enzastaurin. The objective of the study is to assess whether there is superiority of overall survival in patients who are DGM1-positive when enzastaurin is added to the standard regimen of temozolomide with radiation therapy, followed by adjuvant temozolomide and enzastaurin. Participants are randomized into either the investigational enzastaurin arm or the control placebo arm. As a double-blinded study, neither the study participants nor investigators know the participant's DGM1 status or whether the participant is receiving enzastaurin or a placebo. In 2021 our site opened and enrolled 3 patients in this study.

Neuroscience Research Trials

January – December 2021

Neuro-Oncology

1. Trusheim J, Bruns P, McDonald W: A Phase II Clinical Trial Evaluating DCVax®-Brain, Autologous Dendritic Cells Pulsed With Tumor Lysate Antigen For The Treatment Of Glioblastoma Multiforme (GBM)
2. Trusheim J, Tipps M, Banerji N: Validation of Readiband™ Actigraph and Associated Sleep/Wake Classification Algorithms in predicting cancer related fatigue and diseases progression in high grade glioma
3. Trusheim J, Bruns P: A Randomized, Multicenter, Phase 2 Study of DSP-7888 Dosing Emulsion in Combination with Bevacizumab versus Bevacizumab Alone in Patients with Recurrent or Progressive Glioblastoma following Initial Therapy
4. Trusheim J, Banerji N, Bruns P: Care patterns and outcomes for patients with glioblastoma treated at Abbott Northwestern Hospital
5. Tipps M, Banerji N, Hultman M, Jackson K, Melendez V: Identification of genetic markers that predict responsiveness to Tumor Treating Fields
6. Trusheim J, Bruns P: Open-label, Randomized, Controlled, Phase 3 Safety and Efficacy Study of Trans Sodium Crocetin (TSC) with Radiation Therapy and Temozolomide in Newly Diagnosed Glioblastoma (GBM) Biopsy-Only Subjects.
7. Trusheim J, Bruns P, Arakawa A: A Trial to Evaluate Multiple Regimens in Newly Diagnosed and Recurrent Glioblastoma (GBM AGILE)
8. Trusheim J, Bruns P: Pivotal, Randomized, Open-label Study of Optune® Concomitant With RT & TMZ for the Treatment of Newly Diagnosed GBM (EF-32)
9. Trusheim J, Sullivan P, Bruns P: Pivotal, open-label, randomized study of radiosurgery with or without Tumor Treating Fields (TTFields) for 1-10 brain metastases from non-small cell lung cancer (NSCLC)
10. Bruns P, Banerji N: Adjuvant metronomic temozolomide in the management of primary glioblastoma in comparison to standard dosage.
11. Tierney M, Peden-McAlpine S: Quality of life during treatment for glioblastoma: Lived experience of patients and families.
12. Tierney M, Jackson K: Caring for Care Partners: Identifying the Long-Term Changes in Cortisol, Anxiety, Depression and Sleep Quality in Care Partners of Patients with Glioblastoma.

13. McDonald W: Glioma Longitudinal Analysis Consortium (GLASS).

14. Banerji N, Bruns P: Management and outcomes of primary CNS lymphoma at the Givens Brain Tumor Center.

Neuro-Physiology

1. Skinner S, Banerji N: Dose responsiveness as a measure of clinical effectiveness during neuromonitored spine surgery

2. Strommen J: Comparison of three approaches of Motor Evoked Potential recording to detect a more reliable measure to predict and prevent nerve damage during spine surgery.

Neurovascular/Stroke

1. Asaithambi G, Hanson S, Corry J, Monita J, Thacker T, Massaquoi R: Atrial Cardiopathy & Antithrombotic Drugs in Prevention After Cryptogenic Stroke (ARCADIA)

2. Asaithambi G, Hanson S, Corry J, Monita J, Thacker T, Massaquoi R: ARCADIA-Cognition and Silent Infarcts (ARCADIA-CSI)

3. Asaithambi G, Hanson S, Corry J, Thacker T, Massaquoi R: Sleep for Stroke Management And Recovery Trial (Sleep SMART)

4. Corry J, Asaithambi, Shaik A, Hanson S, Thacker T, Massaquoi R, Gazich E: Anticoagulation in Intracerebral Hemorrhage (ICH) Survivors for Stroke Prevention and Recovery (ASPIRE)

5. Corry J, Asaithambi G, Shaik A, Hanson S, Thacker T, Massaquoi R, Gazich E: Statins Use in Intracerebral Hemorrhage Patients (SATURN)

6. Corry J, Tipps M: Conivaptan for the Reduction of Cerebral Edema in Intracerebral hemorrhage-Comparison of PHE volumes to historical cohort

7. Kayan Y, Delgado J, Mulder M: Extracorporeal FILtration of Subarachnoid Hemorrhage Via SpinalCatheter Extension (PILLAR-XT)

8. Kayan Y, Delgado J: FRED System PMA: United States pre-market approval study of a Flow Redirection Endoluminal Device system for the endovascular treatment of cerebral aneurysms (FRED)

9. Kayan Y, Banerji N, Fease J, Delgado J: Study of vasospasm in Subarachnoid hemorrhage patients with Advanced Sequence MRI (SPASM)

10. Kayan Y, Delgado J: Effectiveness of Pipeline Embolization Devices for Distal Cerebral Aneurysm Treatment

11. Delgado J, Kayan Y: WEB-IT PMA: The WEB® Intrasaccular Therapy Study for United States pre-market approval of the WEB® device for The endovascular treatment of wide neck bifurcation intracranial aneurysms (WEB-IT)
12. Delgado J, Kayan Y: Compassionate use of the WEB intrasaccular aneurysm embolization device
13. Delgado J, Kayan Y, Wallace A: Stroke Thromboembolism Registry of Imaging and Pathology (STRIP)
14. Delgado J, Kayan Y: P2Y12 platelet reactivity in neurointerventional procedures: anesthesia and sedation effects (PLATELET)
15. Delgado J, Kayan Y: Neuroform Atlas: Humanitarian Use of the Neuroform Atlas Stent System
16. Delgado J, Kayan Y: miRNA Expression in Aneurysm Healing (miRNA)
17. Delgado J, Kayan Y: Vessel wall enhancement as a biomarker for inflammation and rupture risk in intracranial aneurysms. (VESSEL)
18. Delgado Y, Kayan Y: Retrospective Review of Clinical Outcomes in Patients with Intracranial Aneurysms treated by Endovascular Intervention
19. Shaik A: Extubation strategies in Neuro-Intensive care unit patients, and associations with Outcomes (ENIO)
20. Shaik A: Neurological Critical Care COVID Manifestations
21. Shaik A: Severe Neurologic Injury Outcomes during COVID 19 Crisis
22. Young M, Tarrel R, Roohani P, Milner S: Atrial Cardiopathy and Antithrombotic Drugs In Prevention After Cryptogenic Stroke (ARCADIA)
23. Young M, Tarrel R, Roohani P, Milner S: Atrial Cardiopathy and Antithrombotic Drugs In prevention After cryptogenic stroke - Cognition and Silent Infarcts (ARCADIA-CSI)
24. Young M, Tarrel R, Roohani P, Milner S: Anticoagulation in Intracerebral Hemorrhage (ICH) Survivors for Stroke Prevention and Recovery (ASPIRE)

Publications, Presentations, and Book Chapters

Publications

Liu Y, Brinjikji W, Abbasi M, Dai D, Arturo Larco JL, Madhani SI, Shahid AH, Mereuta OM, Nogueira RG, Kvamme P, Layton KF, **Delgado Almandoz JE**, Hanel RA, Mendes Pereira V, Almekhlafi MA, Yoo AJ, Jahromi BS, Gounis MJ, Patel B, Fitzgerald S, Doyle K, Haussen DC, Al-Bayati AR, Mohammaden M, Pisani L, Rodrigues GM, Thacker IC, **Kayan Y**, **Copelan A**, Aghaebrahim A, Sauvageau E, Demchuk AM, Bhuvu P, Soomro J, Nazari P, Cantrell DR, Puri AS, Entwistle J, Kadirvel R, Cloft HJ, Kallmes DF, Savastano L. Quantification of clot spatial heterogeneity and its impact on thrombectomy. *J Neurointerv Surg*. 2021. E-pub ahead of print on December 15th, 2021.

Lauzier DC, Root BK, **Kayan Y**, **Delgado Almandoz JE**, Osbun JW, Chatterjee AR, **Whaley KL**, **Tipps ME**, Moran CJ, Kansagra AP. Pipeline embolization of distal posterior inferior cerebellar artery aneurysms. *Interv Neuroradiol*. 2021 Dec;27(6):821-827. E-pub ahead of print on April 23rd, 2021.

Abbasi M, Kvamme P, Layton KF, Hanel RA, Almekhlafi MA, **Delgado JE**, Pereira VM, Patel BM, Jahromi BS, Yoo AJ, Nogueira RG, Gounis MJ, Fitzgerald S, Mereuta OM, Dai D, Kadirvel R, Kallmes DF, Doyle KM, Savastano LE, Cloft HJ, Liu Y, Thacker IC, Aghaebrahim A, Sauvageau E, Demchuk AM, **Kayan Y**, **Copelan AZ**, Entwistle J, Nazari P, Cantrell DR, Bhuvu P, Soomro J, Haussen DC, Al-Bayati A, Mohammaden M, Pisani L, Rodrigues G, Puri AS, Brinjikji W. Per pass analysis of thrombus composition retrieved by mechanical thrombectomy. *Interv Neuroradiol*. 2021 Dec; 27(6):815-820. doi: 10.1177/15910199211009119. Epub 2021 Apr 7. PMID: 33823621

Mokin M, Waqas M, Fifi JT, De Leacy R, Fiorella D, Levy EI, Snyder K, Hanel RA, Woodward K, Chaudry I, Rai AT, Frei D, **Delgado Almandoz JE**, Kelly M, Arthur AS, Baxter BW, English J, Linfante I, Fargen KM, Turk A, Mocco J, Siddiqui AH. Intravenous alteplase has different effects on the efficacy of aspiration and stent retriever thrombectomy: analysis of the COMPASS trial. *J Neurointerv Surg*. 2021. E-pub ahead of print on October 14th, 2021.

Cortez GM, Akture E, Monteiro A, Arthur AS, Peterson J, Dornbos D, Jabbour P, Gooch MR, Sweid A, Tjoumakaris SI, **Delgado Almandoz JE**, **Kayan Y**, Rai AT, Boo S, Fiorella D, Vachhani J, Foreman P, Cress M, Siddiqui AH, Waqas M, Aghaebrahim A, Sauvageau E, Hanel RA. Woven EndoBridge device for ruptured aneurysms: perioperative results of a US multicenter experience. *J Neurointerv Surg*. 2021 Nov;13(11):1012-1016. E-pub ahead of print on January 22nd, 2021.

Holdefer RN, Seubert CN, **Skinner SA**, Humbert AT. What are the odds: worse outcomes with IONM? *Journal of Neurosurgery*. 2021 Sep 3; 1(aop):1-2.

Asaithambi G, Tong X, Coleman King SM, George MG. Contemporary Trends in the Treatment of Mild Ischemic Stroke with Intravenous Thrombolysis: Paul Coverdell National Acute Stroke Program. *Cerebrovasc Dis.* 2022;51(1):60-66. doi: 10.1159/000517969. Epub 2021 Aug 17. PMID: 34515074.

Tong X, King SMC, **Asaithambi G**, Odom E, Yang Q, Yin X, Merritt RK. COVID-19 Pandemic and Quality of Care and Outcomes of Acute Stroke Hospitalizations: the Paul Coverdell National Acute Stroke Program. *Prev Chronic Dis.* 2021 Aug 19; 18:E82. doi: 10.5888/pcd18.210130. PMID: 34410906.

Asaithambi G, Tipps ME.Effect of Intensive Glucose Control on Outcomes of Hyperglycemic Stroke Patients Receiving Mechanical Thrombectomy: Secondary Analysis of the SHINE Trial. *J Neurosurg Anesthesiol.* 2021 Aug 5. doi: 10.1097/ANA.0000000000000795. PMID: 34354023

Asaithambi G, Marino EH, Ho BM, Tipps ME.Outcomes of Homeless Ischemic Stroke Patients Receiving Intravenous Thrombolysis in the United States. *J Stroke Cerebrovasc Dis.* 2021 Aug; 30(8):105862. doi: 10.1016/j.jstrokecerebrovasdis.2021.105862. Epub 2021 May 23. PMID: 34034124

Asaithambi G, Tipps ME.Quality of life among ischemic stroke patients eligible for endovascular treatment: analysis of the DEFUSE 3 trial. *J Neurointerv Surg.* 2021 Aug; 13(8):703-706. doi: 10.1136/neurintsurg-2020-016399. Epub 2020 Aug 4. PMID: 32753555

Amans MR, Smith E, Narsinh KH, Dowd CF, Higashida RT, Halbach VV, Hetts SW, Cooke DL, Nelson J, Mccoy D, Ciano M, Dillon WP, **Copelan AZ**, Drocton GT, Khangura RS, Murph D, Hartley ZJ, Abla AA. Reply. *AJNR Am J Neuroradiol.* 2021 Aug;42(8):E58-E59. doi: 10.3174/ajnr.A7160. Epub 2021 May 13. PMID: 33985958; PMCID: PMC8367619.

Mereuta OM, Abbasi M, Fitzgerald S, Dai D, Kadirvel R, Hanel RA, Yoo AJ, Almekhlafi MA, Layton KF, **Delgado Almandoz JE**, Kvamme P, Mendes Pereira V, Jahromi BS, Nogueira RG, Gounis MJ, Patel B, Aghaebrahim A, Sauvageau E, Bhuva P, Soomro J, Demchuk AM, Thacker IC, **Kayan Y, Copelan A**, Nazari P, Cantrell DR, Haussen DC, Al-Bayati AR, Mohammaden M, Pisani L, Rodrigues GM, Puri AS, Entwistle J, Meves A, Arturo Larco JL, Savastano L, Cloft HJ, Kallmes DF, Doyle KM, Brinjikji W. Histological evaluation of acute ischemic stroke thrombi may indicate the occurrence of vessel wall injury during mechanical thrombectomy. *J Neurointerv Surg.* 2021. E-pub ahead of print on May 11th, 2021.

McDougall CG, Diaz O, Boulos A, Siddiqui AH, Caplan J, Fifi JT, Turk AS, **Kayan Y**, Jabbour P, Kim LJ, Hetts SW, Cooke DL, Dowd CF. Safety and efficacy results of the Flow Redirection Endoluminal Device (FRED) stent system in the treatment of intracranial aneurysms: US pivotal trial. *J Neurointerv Surg.* 2021 Jul 19: neurintsurg-2021-017469. doi: 10.1136/neurintsurg-2021-017469. Online ahead of print. PMID: 34282038

Brinjikji W, Nogueira RG, Kvamme P, Layton KF, **Delgado Almandoz JE**, Hanel RA, Mendes Pereira V, Almekhlafi MA, Yoo AJ, Jahromi BS, Gounis MJ, Patel B, Abbasi M, Fitzgerald S, Mereuta OM, Dai D, Kadirvel R, Doyle K, Savastano L, Cloft HJ, Haussen DC, Al-Bayati AR, Mohammaden MH, Pisani L, Rodrigues GM, Thacker IC, **Kayan Y, Copelan A**, Aghaebrahim A, Sauvageau E, Demchuk AM, Bhuva P, Soomro J, Nazari P, Cantrell DR, Puri AS, Entwistle

J, Polley EC, Kallmes DF. Association between clot composition and stroke origin in mechanical thrombectomy patients: analysis of the Stroke Thromboembolism Registry of Imaging and Pathology. *J Neurointerv Surg*. 2021 Jul;13(7):594-598. E-pub ahead of print on March 15th, 2021.

Caton MT, **Copelan AZ**, Narsinh KH, Baker A, Abla AA, Higashida RT, Amans MR, Hetts SW, Cooke DL. The Geometry of Y-Stent Configurations Used for Wide-Necked Aneurysm Treatment: Analyzing Double-Barrel Stents In Vitro Using Flat-Panel Computed Tomography. *World Neurosurg*. 2021 Jul;151:e363-e371. doi: 10.1016/j.wneu.2021.04.042. Epub 2021 Apr 19. PMID: 33887500.

Fargen KM, Lee SK, Mokin M, **Kayan Y**, De Leacy R, Al-Mufti F, Ansari SA, Haranhalli N, Prestigiacomo CJ, Schirmer CM, Fraser JF, Hetts SW; SNIS Standards and Guidelines Committee; SNIS Board of Directors. Social media usage for neurointerventionalists: report of the Society of NeuroInterventional Surgery Standards and Guidelines Committee. *J Neurointerv Surg*. 2021 Jul; 13(7):674-678. doi: 10.1136/neurintsurg-2021-017278. Epub 2021 Mar 15. PMID: 33722972.

Asaithambi G, Tong X, Lakshminarayan K, Coleman King SM, George MG. Effect of Insurance Status on Outcomes of Acute Ischemic Stroke Patients Receiving Intra-Arterial Treatment: Results from the Paul Coverdell National Acute Stroke Program. *J Stroke Cerebrovasc Dis*. 2021 May;30(5):105692. doi: 10.1016/j.jstrokecerebrovasdis.2021.105692. Epub 2021 Mar 4. PMID: 33676326.

McDonald WC, McDonald KN, Helmer JA, **Ho B**, Wang A, **Banerji N**. The Role of T-box Transcription Factor in a Pituitary Adenoma Diagnostic Algorithm. *Arch Pathol Lab Med*. 2021 May 1;145(5):592-598. doi: 10.5858/arpa.2020-0091-OA. PMID: 32991684.

Narsinh KH, Kilbride BF, Mueller K, Murph D, **Copelan A**, Massachi J, Vitt J, Sun CH, Bhat H, Amans MR, Dowd CF, Halbach VV, Higashida RT, Moore T, Wilson MW, Cooke DL, Hetts SW. Combined Use of X-ray Angiography and Intraprocedural MRI Enables Tissue-based Decision Making Regarding Revascularization during Acute Ischemic Stroke Intervention. *Radiology*. 2021 Apr;299(1):167-176. doi: 10.1148/radiol.2021202750. Epub 2021 Feb 9. PMID: 33560189; PMCID: PMC7997614.

Asaithambi G, Tong X, Lakshminarayan K, Coleman King SM, George MG, Odom EC. Emergency Medical Services Utilization for Acute Stroke Care: Analysis of the Paul Coverdell National Acute Stroke Program, 2014-2019. *Prehosp Emerg Care*. 2021 Feb 22:1-7. doi: 10.1080/10903127.2021.1877856. PMID: 33464940.

Rose TR, Marron Fernandez de Velasco E, Vo BN, **Tipps ME**, Wickman K. Impact of Acute and Persistent Excitation of Prelimbic Pyramidal Neurons on Motor Activity and Trace Fear Learning. *J Neurosci*. 2021 Feb 3;41(5):960-971. doi: 10.1523/JNEUROSCI.2606-20.2020. Epub 2021 Jan 5. PMID: 33402420; PMCID: PMC7880283.

Presentations

Skinner, S. *Approaches to Evidence*. XXVIII Brazilian Congress of Clinical Neurophysiology. Invited lecture Nov, 2021.

Delgado, JE. *Institutional Experience and Approach to Endovascular Aneurysm Treatment with WEB*, presented to Neurointerventionalists at the 24th Congress of the Sociedade Brasileira de Radiologia Intervencionista e Cirurgia Endovascular (SoBRICE) on October 14th, 2021.

Delgado Almandoz JE, Kayan Y, Copelan A, Scholz JM. *Adequate lateral compression is a strong independent predictor of aneurysm occlusion and retreatment after endovascular treatment with WEB*. Presented as an oral scientific presentation at the Society of NeuroInterventional Surgery 18th Annual Meeting in Colorado Springs on July 26, 2021.

Delgado Almandoz JE, Kayan Y, Copelan A, Scholz JM. *Aneurysm occlusion rate decreases with increasing WEB width despite adequate WEB lateral compression*. Presented as an oral scientific presentation at the Society of NeuroInterventional Surgery 18th Annual Meeting in Colorado Springs on July 26, 2021.

Dandapat S, Wallace A, Lopez G, **Kayan Y**, Mendez Ruiz A, Copelan A, Dajles A, Zevallos C, Quispe-Orozco D, Farooqui M, **Delgado Almandoz JE**, Ortega-Gutierrez S. *Safety and Efficacy of Stent-Assisted Coiling of Ruptured Wide Neck Aneurysms in Comparison to Balloon Assisted Coiling in Acute Subarachnoid Hemorrhage*. Presented as an electronic scientific poster at the Society of NeuroInterventional Surgery 18th Annual Meeting in Colorado Springs on July 26, 2021.

Copelan A, Delgado Almandoz JE, Kayan Y, Scholz J. *Endovascular treatment of wide-neck bifurcation aneurysms: a single-center experience and paradigm shift*. Presented as a moderated scientific poster at the Society of NeuroInterventional Surgery 18th Annual Meeting in Colorado Springs on July 26, 2021.

Delgado, JE. *Approach to Endovascular Aneurysm Treatment with the Woven EndoBridge (WEB) at Abbott Northwestern Hospital*, presented as a webinar at the Society of Vascular and Interventional Neurology's Break 2021 Online Conference on May 20th, 2021.

Delgado, JE. *Approach to Endovascular Cerebral Aneurysm Treatment*, presented as a webinar at Dignity Health Neurological Institute of Northern California's 2021 Neurosciences Symposium on May 12th, 2021.

Delgado, JE. *La Técnica ADAPT: Tips para Lograr Recanalización en un Primer Pase*, presented as a webinar at the Asociación Colombia de Radiología's virtual course on "Controversias en Manejo Endovascular del ACV" on May 10th, 2021.

Delgado, JE. *Complicaciones del Tratamiento Endovascular de Aneurismas Cerebrales y Cómo Evitarlas*, presented as a webinar at the Grupo Sudamericano de trabajo en Neurorradiologia Intervencionista y Terapéutica 30th Annual Meeting on April 23rd, 2021.

Delgado, JE. *Experiencia Institucional y Abordaje de la Embolización de Aneurismas Cerebrales con WEB*, presented to Neurointerventionalists at the Webinar de la Sección Cerebro-Vascular de la Sociedad Mexicana de Cirugía Neurológica on March 18th, 2021.

Skinner, S. *IONM Evidence: From Necessary Statistics to Sufficient Trials and Lecture: IONM efficacy v effectiveness: an IONM v No IONM registry.* American Clinical Neurophysiology Society. Feb 2021 Annual Courses. Invited Symposium, moderator.

Skinner, S. *Spinal Cord Untethering and Guidance in LLIF II Focus on Quadriceps MEP.* American Society Neurophysiological Monitoring Winter Course Invited Lectures. Feb 2021.

Book Chapters

Skinner, S. In Nuwer, M and MacDonald, D, editors. *Intraoperative Monitoring: Handbook of Clinical Neurology*, 2nd edition. Elsevier, in preparation. *Monitoring Lumbar Stenosis and Fusion Surgery; Neurophysiology during Peripheral Nerve Surgery; EMG and Peripheral Monitoring Techniques.*

Skinner, S. In Koht A, Sloan T, Toleikis, JR, editors. *Monitoring the Nervous System for Anesthesiologists and Other Health Care Professionals*, 3rd Edition. Springer, in preparation. *Intraoperative Electromyography*