

CURRICULUM VITAE  
The Johns Hopkins University School of Medicine

*Sung-Min Cho*  
Sung-Min Cho, D.O., M.H.S.

1/25/2023

## DEMOGRAPHIC AND PERSONAL INFORMATION

### Current Appointments

#### University

- 2020-present Assistant Professor, Departments of Neurology, Neurosurgery, Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine
- 2021-present Assistant Professor, Division of Cardiac Surgery, Departments of Surgery, Johns Hopkins University School of Medicine

#### Hospital

- 2019-present Attending Physician, Neuroscience Critical Care Unit, Johns Hopkins Hospital

#### Other

- 2020-present Director of Adult ECMO Research, Division of Cardiac Surgery, Johns Hopkins Hospital
- 2022-present Co-Director of the HERALD (Hopkins Exploration, Research, and Advancement in Life support Devices) Program, Johns Hopkins Hospital

### Personal Data

- Division of Neuroscience Critical Care  
Departments of Neurology, Surgery, Neurosurgery, Anesthesiology and Critical Care Medicine  
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### Education and Training

#### Undergraduate

- 2002-2004 Physics, Yonsei University, Seoul, South Korea
- 2004-2008 B.S., University of Cincinnati, Cincinnati, OH

#### Doctoral/Graduate

- 2009-2013 D.O., Ohio University, Athens, OH
- 2019-2020 M.H.S., Johns Hopkins University, Baltimore, MD

#### Postdoctoral

- 2013-2014 Intern, Internal Medicine, Cleveland Clinic Foundation, Cleveland, OH
- 2014-2017 Resident, Neurology, Cleveland Clinic Foundation, Cleveland, OH
- 2017-2019 Fellowship, Neurocritical Care, Johns Hopkins Hospital, Johns Hopkins University School of Medicine, Baltimore, MD

### Professional Experience

- 2019-2020 Instructor, Departments of Neurology, Neurosurgery, Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD
- 2020-present Director of Adult ECMO Research, Division of Cardiac Surgery, Johns Hopkins Hospital
- 2020-present Assistant Professor, Departments of Neurology, Neurosurgery, Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine

## PUBLICATIONS

\* First and senior author papers

Original Research [OR]

1. Cerejo R, John S, Buletko AB, Taqui A, Itrat A, Organek N, **Cho SM**, Sheikhi L, Uchino K, Briggs F, Reimer AP, Winners S, Toth G, Rasmussen P, Hussain MS. Impact of mobile stroke treatment unit in early triage of patients with acute ischemic stroke for intra-arterial therapy. *J Neuroimaging*. 2015;25(6):940-945. *Subject recruitment, patient data gathering, manuscript revision*
2. Itrat A, Taqui A, Cerejo R, Briggs F, **Cho SM**, Organek N, Reimer AP, Winners S, Rasmussen P, Hussain MS, Uchino K; On Behalf of the Cleveland Pre-Hospital Acute Stroke Treatment (PHAST) Group. Telemedicine in prehospital stroke evaluation and thrombolysis: Taking stroke treatment to the doorstep. *JAMA Neurol*. 2016;73(2):162-168. *Subject recruitment, patient data gathering, manuscript revision*
3. Taqui A, Cerejo R, Itrat A, Briggs FB, Reimer AP, Winners S, Organek N, Buletko AB, Sheikhi L, **Cho SM**, Buttrick M, Donohue MM, Khawaja Z, Wisco D, Frontera JA, Russman AN, Hustey FM, Kralovic DM, Rasmussen P, Uchino K, Hussain MS; On Behalf of the Cleveland Pre-Hospital Acute Stroke Treatment (PHAST) Group. Reduction in time to treatment in prehospital telemedicine evaluation and thrombolysis. *Neurology*. 2017;88(14):1305-1312. *Subject recruitment, patient data gathering, manuscript revision*
4. **\*Cho SM**, Moazami N, Frontera JA. Stroke and intracranial hemorrhage in HeartMate II and HeartWare left ventricular assist devices: A systematic review. *Neurocrit Care*. 2017;27(1):17-25.
5. Frontera JA, Starling R, **Cho SM**, Nowacki AS, Uchino K, Hussain MS, Mountis M, Moazami N. Risk factors, mortality, and timing of ischemic and hemorrhagic stroke with left ventricular assist devices. *J Heart Lung Transplant*. 2017;36(6):673-683. *Patient data gathering, data analysis, manuscript writing and revision*
6. **\*Cho SM**, Deshpande A, Pasupuleti V, Hernandez AV, Uchino K. Radiographic and symptomatic brain ischemia in CEA and CAS: A systematic review and meta-analysis. *Neurology*. 2017;89(19):1977-1984.
7. **\*Cho SM**, Deshpande A, Pasupuleti V, Hernandez AV, Uchino K. Radiographic and clinical brain infarcts in cardiac and diagnostic procedures: A systematic review and meta-analysis. *Stroke*. 2017;48(10):2753-2759.
8. **\*Cho SM**, Rice C, Marquardt RJ, Zhang LQ, Khoury J, Thatikunta P, Buletko AB, Harman J, Uchino K, Wisco D. Magnetic resonance imaging susceptibility-weighted imaging lesion and contrast enhancement may represent infectious intracranial aneurysm in infective endocarditis. *Cerebrovasc Dis*. 2017;44(3-4):210-216.
9. **\*Cho SM**, Marquardt RJ, Rice CJ, Buletko AB, Zhang LQ, Khoury J, Thatikunta P, Hardman J, Wisco D, Uchino K. Cerebral microbleeds predict infectious intracranial aneurysm in infective endocarditis. *Eur J Neurol*. 2018;25(7):970-975.
10. Buletko AB, Thacker T, **Cho SM**, Mathew J, Thompson NR, Organek N, Frontera JA, Uchino K. Cerebral ischemia and deterioration with lower blood pressure target in intracerebral hemorrhage. *Neurology*. 2018;91(11):e1058-e1066. *Patient data gathering, data analysis, manuscript revision*
11. **\*Cho SM**, Lee T, Starling R, Thompson NR, Uchino K. The impact of infection and elevated INR in LVAD-associated intracranial hemorrhage: A case-crossover study. *ASAIO J*. 2019;65(6):545-549. Selected as the Editor's Pick and "Meet the Authors" Highlight.
12. Rice CJ, **Cho SM**, Taqui A, Moore NZ, Witek AM, Bain MD, Uchino K. Early versus delayed extracranial-intracranial bypass surgery in symptomatic atherosclerotic occlusion. *neurosurgery*. 2019;85(5):656-663. *Patient data gathering, data analysis, manuscript revision*
13. Farrokh S, **Cho SM**, Lefebvre AT, Zink EK, Schiavi A, Puttgen HA. Use of intraosseous hypertonic saline in critically ill patients. *J Vasc Access*. 2019;20(4):427-432. *Patient data gathering, data analysis, manuscript revision*
14. **\*Cho SM**, Hassett C, Rice CJ, Starling R, Katzan I, Uchino K. What causes LVAD-associated ischemic stroke? Surgery, pump thrombosis, antithrombotics, and infection. *ASAIO J*. 2019;65(8):775-780.
15. Migdady I, Rice CJ, Hassett C, Zhang LQ, Wisco D, Uchino K, **\*Cho SM**. MRI presentation of infectious intracranial aneurysms in infective endocarditis. *Neurocrit Care*. 2019;30(3):658-665.
16. Rice CJ, **Cho SM**, Marquardt RJ, Zhang LQ, Khoury J, Hardman J, Wisco D, Hussain MS, Uchino K. Clinical course of infectious intracranial aneurysm undergoing antibiotic treatment. *J Neurol Sci*. 2019;403:50-55. *Patient data gathering, data analysis, manuscript revision*
17. **\*Cho SM**, Moazami N, Katz S, Starling R, Frontera JA. Reversal and resumption of antithrombotic therapy in LVAD-associated intracranial hemorrhage. *Ann Thorac Surg*. 2019;108(1):52-58.
18. **\*Cho SM**, Moazami N, Katz S, Bhimraj A, Shrestha NK, Frontera JA. Stroke risk following infection in patients with continuous-flow left ventricular assist device. *Neurocrit Care*. 2019;31(1):72-80.
19. **\*Cho SM**, Ziai W, Mayasi Y, Gusdon AM, Creed J, Sharrock M, Stephens RS, Choi CW, Ritzl EK, Suarez J, Whitman G, Geocadin RG. Noninvasive neurological monitoring in extracorporeal membrane oxygenation. *ASAIO J*. 2020;66(4):388-393.

20. Marquardt RJ, **Cho SM**, Thatikunta P, Deshpande A, Wisco D, Uchino K. Acute ischemic stroke therapy in infective endocarditis: Case series and systematic review. *J Stroke Cerebrovasc Dis.* 2019;28(8):2207-2212. *Data analysis, manuscript revision*
21. Dionisio S, Mayoglou L, **Cho SM**, Prime D, Flanigan PM, Lega B, Mosher J, Leahy R, Gonzalez-Martinez J, Nair D. Connectivity of the human insula: A cortico-cortical evoked potential (CCEP) study. *Cortex.* 2019;120:419-442.
22. Lee T, Buletko AB, Matthew J, **\*Cho SM**. Bloodstream infection is associated with subarachnoid hemorrhage and infectious intracranial aneurysm in left ventricular assist device. *Perfusion.* 2020;35(2):117-120. *Patient data gathering, data analysis, manuscript revision*
23. **\*Cho SM**, Choi CW, Whitman G, Suarez JI, Martinez NC, Geocadin RG, Ritzl EK. Neurophysiologic findings and brain injury pattern in patients on ECMO. *Clin EEG Neurosci.* 2021;52(6):462-469.
24. Rice CJ, **Cho SM**, Strohm T, Raber L, Katzan IL, Hussain MS, Uchino K. Ultrasound criteria for assessment of vertebral artery origins. *J Neuroimaging.* 2020; 30(1):45-49. *Patient data gathering, data analysis, manuscript revision*
25. **\*Cho SM**, Geocadin RG, White B, Chen LL. Neuropathological findings in comatose patients with venoarterial extracorporeal membrane oxygenation. *Int J Artif Organs.* 2020; 391398820901829.
26. Hassett CE, **Cho SM**, Hasan S, Rice C, Migdady I, Starling C, Soltesz E, Uchino K. Ischemic stroke and intracranial hemorrhages during Impella cardiac support. *ASAIO J.* 2020; 66(8):e105-e109. *Patient data gathering, data analysis, manuscript revision*
27. **\*Cho SM**, Starling RC, Teuteberg J, Rogers J, Pagani F, Shah P, Uchino K, Hiivala N. Understanding risk factors and predictors for stroke subtypes in the ENDURANCE trials. *J Heart Lung Transplant.* 2020;39(7):639-647.
28. Hassett CE, **Cho SM**, Rice CJ, Migdady I, Starling RC, Uchino K, Katzan IL. Cerebral microembolization in left ventricular assist device associated ischemic events. *J Stroke Cerebrovasc Dis.* 2020;29(4):104660. *Data analysis, manuscript revision*
29. **\*Cho SM**, Geocadin RG, Caturegli G, Chan V, White B, Dodd-o J, Kim BS, Sussman M, Choi CW, Whitman GR, Chen LL. Understanding characteristics of acute brain injury in adult ECMO: An autopsy study. *Crit Care Med.* 2020;48(6)e532-e536.
30. Migdady I, Stephens RS, Price C, Geocadin RG, Whitman G, **\*Cho SM**. The use of apnea test and brain death determination in patients on extracorporeal membrane oxygenation: a systematic review. *J Thorac Cardiovasc Surg.* 2021;162(3):867-877.e1.
31. Migdady I, Rice C, Deshpande A, Hernandez AV, Price C, Whitman GJ, Geocadin RG, **\*Cho SM**. Brain injury and neurologic outcome in patients undergoing extracorporeal cardiopulmonary resuscitation: A systematic review and meta-analysis. *Crit Care Med.* 2020; 48:e611-e619.
32. Fan TH, Hassett CE, Migdady I, Price C, Choi CW, Katzan I, **\*Cho SM**. How are we monitoring brain injuries in patients with left ventricular assist device? A systematic review of the literature. *ASAIO J.* 2021; 67:149-156.
33. Murthy SB, **Cho SM**, Gupta A, Shoamanesh A, Navi BB, Avadhani R, Gruber J, Li Y, Greige T, Lioutas VA, Norton C, Zhang C, Mandava P, Iadecola C, Falcone GJ, Sheth KN, Biffi A, Rosand J, Qureshi AI, Goldstein JN, Kidwell C, Selim M, Hanley DF, Woo D, Kamel H, Ziai WC. A pooled analysis of diffusion-weighted imaging lesions in patients with acute intracerebral hemorrhage. *JAMA Neurol.* 2020;77(11):1390-1397. *Patient data gathering, data analysis, manuscript revision*
34. **\*Cho SM**, Canner J, Chiarini G, Calligy K, Caturegli G, Rycus P, Barbaro RP, Tonna J, Lorusso R, Kilic A, Choi CW, Ziai W, Geocadin R, Whitman G. Modifiable risk factors and mortality from ischemic and hemorrhagic strokes in patients receiving venoarterial extracorporeal membrane oxygenation: results from the Extracorporeal Life Support Organization Registry. *Crit Care Med.* 2020; 48:e897-e905.
35. Shoskes A, Migdady I, Rice C, Hassett C, Deshpande A, Price C, Hernandez AV, **\*Cho SM**. Brain injury is more common in venoarterial extracorporeal membrane oxygenation than venovenous extracorporeal membrane oxygenation: a systematic review and meta-analysis. *Crit.Care Med.* 2020; 48:1799-1808.
36. Caturegli G, **Cho SM**, White B, Chen LL. Acute brain injury in infant venoarterial extracorporeal membrane oxygenation: an autopsy study. *Pediatr Crit Care Med.* 2021; 22:297-302. *Patient data analysis, manuscript revision*
37. Wei Z, Wang Q, Modi HR, **Cho SM**, Geocadin R, Thakor NV, Lu H. Acute-stage MRI cerebral oxygen consumption biomarkers predict 24-hour neurological outcome in a rat cardiac arrest model. *NMR Biomed.* 2020; 33:e4377. *Patient data analysis, manuscript revision*
38. Zhang LQ, **Cho SM**, Rice CJ, Khoury J, Marquardt RJ, Buletko AB, Hardman J, Wisco D, Uchino K. Valve surgery for infective endocarditis complicated by stroke: surgical timing and perioperative neurologic complications. *Eur J Neurol.* 2020; 27:2430-2438. *Patient data gathering, data analysis, manuscript revision*
39. Kannapadi NV, White B, Woo CC, Chen LL, **\*Cho SM**. Clinically silent brain injury and perioperative neurological events in patients with left ventricular assist device: a brain autopsy study. *ASAIO J.* 2021;67(8):917-922.

40. Ong BA, Geocadin R, Choi CW, Whitman G, **\*Cho SM**. Brain magnetic resonance imaging in adult survivors of extracorporeal membrane oxygenation. *Perfusion*. 2021;36(8):814-824.
41. Hunt MF, Clark KT, Whitman G, Choi CW, Geocadin RG, **\*Cho SM**. The use of cerebral NIRS monitoring to identify acute brain injury in patients with VA-ECMO. *J Intensive Care Med*. 2020; 36:1403-1409.
42. Hunt MF, Clark KT, Grant MC, Choi CW, Whitman G, **Cho SM**, Farrokh S. Therapeutic drug monitoring of valproic acid in extracorporeal membrane oxygenation. *Perfusion*. 2021;36(8):868-872.
43. **\*Cho SM**, Canner J, Caturegli G, Choi CW, Etchill E, Giuliano K, Chiarini G, Calligy K, Rycus P, Lorusso R, Kim BS, Sussman M, Suarez JI, Geocadin R, Bush EL, Ziai W, Whitman G. Risk factors of ischemic and hemorrhagic strokes during venovenous extracorporeal membrane oxygenation: analysis of data from the Extracorporeal Life Support Organization Registry. *Crit Care Med*. 2021; 49:91-101.
44. Mayer K, Jolley S, Etchill EW, Fakhri S, Hoffman J, Sevin CM, Zwischenberger, JB, Rove JY. **\*ORACLE Group Authors: Whitman GJ, Parker A, Mart MF, Hippensteel, JA, Bartels K, Montgomery-Yates, AA, Cho SM, Kim, BS, Ramani C, Kadl A, Enfield K.** Long-term recovery of survivors of coronavirus disease (COVID-19) treated with extracorporeal membrane oxygenation: The next imperative. *JTCVS Open*. 2021;5:163-168. *Manuscript revision*
45. Fan TH, Khoury J, **Cho SM**, Bhimraj A, Shoskes A, Uchino K. Cerebrovascular complications and vasculopathy in patients with herpes simplex virus central nervous system infection. *J Neurol.Sci*. 2020; 419:117200. *Patient data analysis, manuscript revision*
46. Murthy SB, Zhang C, Gupta A, **Cho SM**, Rivera-Lara L, Avadhani R, Gruber J, Iadecola C, Falcone GJ, Sheth KN, Qureshi AI, Goldstein JN, Hanley DF, Kamel H, Ziai WC. Diffusion-weighted imaging lesions after intracerebral hemorrhage and risk of stroke: a MISTIE III and ATACH-2 analysis. *Stroke*. 2021; 52:595-602. *Patient data gathering, data analysis, manuscript revision*
47. Migdady I, Shoskes A, Hasan LZ, Hassett C, George P, Newey C, **Cho SM**, Rae-Grant A, Uchino K. Timing of acute stroke in COVID-19--a health system registry study. *Neurohospitalist*. 2021 Oct;11(4):285-294. *Patient data analysis, manuscript revision*
48. Wilcox C, Etchill E, Giuliano K, Mayasi Y, Gusdon AM, Choi CW, Kim BS, Bush EL, Geocadin RG, Whitman GJ, **\*Cho SM**. Acute brain injury in postcardiotomy shock treated with venoarterial extracorporeal membrane oxygenation. *J Cardiothorac Vasc Anesth*. 2021;35(7):1989-1996.
49. Migdady I, Amin M, Shoskes A, Hassett C, **Cho SM**, George P, Rae-Grant A. The effect of incorporating an arterial pH target during apnea test for brain death determination. *J Intensive Care*. 021 Jan 20;9(1):13. *Patient data analysis, manuscript revision*
50. Hwang J, Caturegli G, White B, Chen L, **\*Cho SM**. Cerebral microbleeds and intracranial hemorrhages in adult patients on extracorporeal membrane oxygenation-autopsy study. *Crit Care Explor*. 2021; 3:e0358.
51. Kannapadi NV, Alomari SO, Caturegli G, Bydon A, **\*Cho SM**. Management of syringomyelia associated with tuberculous meningitis: a case report and systematic review of the literature. *J Clin Neurosci*. 2021; 87:20-25.
52. Migdady I, Amin M, Shoskes A, Hassett C, Rae-Grant A, Snider SB, Greer DM, **Cho SM**, George P. Outcomes, time-trends, and factors associated with ancillary study use for the determination of brain death. *Crit Care Med*. 2021;49(9):e840-e848. *Patient data analysis, manuscript revision*
53. Al-Kawaz MN, Canner J, Caturegli G, Kannapadi N, Balucani C, Shelley L, Kim BS, Choi CW, Geocadin RG, Whitman G, **\*Cho SM**. Duration of hyperoxia and neurologic outcomes in patients undergoing extracorporeal membrane oxygenation. *Crit Care Med*. 2021;49(10):e968-e977.
54. Swetlik C, Migdady I, Hasan LZ, Buletko AB, Price C, **\*Cho SM**. Cannabis use and stroke: does a risk exist? *J Addict Med* . 2022 Mar-Apr;16(2):208-215.
55. Li Bassi G, Suen JY, Dalton HJ, White N, Shrapnel S, Fanning JP, Liqueet B, Hinton S, Vuorinen A, Booth G, Millar JE, Forsyth S, Panigada M, Laffey J, Brodie D, Fan E, Torres A, Chiumello D, Corley A, Elhazmi A, Hodgson C, Ichiba S, Luna C, Murthy S, Nichol A, Ng PY, Ogino M, Pesenti A, Trieu HT, Fraser JF; **COVID-19 Critical Care Consortium**. An appraisal of respiratory system compliance in mechanically ventilated covid-19 patients. *Crit Care*. 2021;25(1):199. *Manuscript revision*
56. Carlson JM, Etchill EW, Enriquez CAG, Peeler A, Whitman GJ, Choi CW, Geocadin RG, **\*Cho SM**. Population characteristics and markers for withdrawal of life-sustaining therapy in patients on extracorporeal membrane oxygenation. *J Cardiothorac Vasc Anesth*. 2022 Mar;36(3):833-839.
57. Ziai WC, **Cho SM**, Johansen MC, Ergin B, Bahouth MN. Transcranial Doppler in acute COVID-19 infection: unexpected associations. *Stroke*. 2021; 52(7):2422-2426. *Patient data analysis, manuscript revision*
58. Minhas AS, Shade JK, **Cho SM**, Michos ED, Metkus T, Gilotra NA, Sharma G, Trayanova N, Hays AG. The role of sex and inflammation in cardiovascular outcomes and mortality in COVID-19. *Int J Cardiol*. 2021;337:127-131. *Patient data gathering, data analysis, manuscript revision*

59. [Huang M](#), [Shoskes A](#), [Migdady I](#), Amin M, Hasan L, Price C, Uchino K, Choi CW, Hernandez AV, **\*Cho SM**. Does targeted temperature management improve neurological outcome in extracorporeal cardiopulmonary resuscitation (ECPR)? *J Intensive Care Med* . 2022 Feb;37(2):157-167.
60. [Kannapadi NV](#), [Jami M](#), [Premraj L](#), [Etchill EW](#), [Giuliano K](#), Bush EL, Kim BS, Seal S, Whitman G, **\*Cho SM**. Neurologic injury in patients with COVID-19 who receive VV-ECMO therapy: a cohort study. *J Cardiothorac Vasc Anesth*. 2021; 35:3456-3461.
61. **\*Cho SM**, Premraj L, Fanning J, Huth S, Barnett A, Whitman G, Arora RC, Battaglini D, Porto DB, Choi H, Suen J, Bassi GL, Fraser JF, Robba C, Griffiee M. Ischemic and hemorrhagic stroke among critically ill patients with coronavirus disease 2019: an international multicenter Coronavirus Disease 2019 Critical Care Consortium Study. *Crit Care Med*. 2021 Dec 1;49(12):e1223-e1233.
62. Garcia MA, Barreras PV, Lewis A, Pinilla G, Sokoll LJ, Kickler T, Mostafa H, Caturegli M, Moghekar A, Fitzgerald KC; **Hopkins Neuro-COVID-19 Group**, Pardo CA. Cerebrospinal fluid in COVID-19 neurological complications: Neuroaxonal damage, anti-SARS-Cov2 antibodies but no evidence of cytokine storm. *J Neurol Sci*. 2021;427:117517. *Data contribution and manuscript revision*
63. [Giuliano K](#), Bigelow BF, [Etchill EW](#), Velez AK, [Ong CS](#), Choi CW, Bush E, **Cho SM**, Whitman GJR. Extracorporeal membrane oxygenation complications in heparin- and bivalirudin-treated patients. *Crit Care Explor*. 2021; 3:e0485. *Data analysis and manuscript revision*
64. Huth SF, **Cho SM**, Robba C, Highton D, Battaglini D, Bellapart J, Suen JY, Li Bassi G, Taccone FS, Arora RC, Whitman G, Fraser JF, Fanning JP. Neurological manifestations of coronavirus disease 2019: a comprehensive review and meta-analysis of the first 6 months of pandemic reporting. *Front Neurol*. 2021; 12:664599. *Study concept, design, data analysis and manuscript revision*
65. **ISARIC Clinical Characterisation Group**. COVID-19 symptoms at hospital admission vary with age and sex: results from the ISARIC prospective multinational observational study. *Infection*. 2021;49(5):889-905. *Data contribution and manuscript revision*
66. [Migdady I](#), [Shoskes A](#), Amin M, **Cho SM**, Rae-Grant A, George P. Determination of brain death in patients undergoing short-term mechanical circulatory support devices. *Heart Lung Circ*. 2022 Feb;31(2):239-245. *Data analysis and manuscript revision*
67. Li Bassi G, Suen JY, Dalton HJ, White N, Shrapnel S, Fanning JP, Liquet B, Hinton S, Vuorinen A, Booth G, Millar JE, Forsyth S, Panigada M, Laffey J, Brodie D, Fan E, Torres A, Chiumello D, Corley A, Elhazmi A, Hodgson C, Ichiba S, Luna C, Murthy S, Nichol A, Ng PY, Ogino M, Pesenti A, Trieu HT, Fraser JF; **COVID-19 Critical Care Consortium**. An appraisal of respiratory system compliance in mechanically ventilated covid-19 patients. *Crit Care*. 2021;25(1):199. *Data contribution and manuscript revision*
68. **\*Cho SM**, Floden D, Wallace K, Hiivala N, Joseph S, Teuteberg J, Rogers JG, Pagani FD, Mokadam N, Tirschwell D, Li S, Starling RC, Mahr C, Uchino K. Long-term neurocognitive outcome in patients with continuous flow left ventricular assist device. *JACC: Heart Fail*. 2021;9(11):839-851.
69. **\*Cho SM**, Mehaffey JH, Meyers SL, Cantor RS, Starling RC, Kirklin JK, Jacobs JP, Kern J, Uchino K, Yarboro LT. Cerebrovascular events in patients with centrifugal-flow left ventricular assist devices: propensity score-matched analysis from the intermacs registry. *Circulation*. 2021; 144:763-772.
70. [Fan TH](#), **Cho SM**, Prayson RA, [Hassett CE](#), Starling RC, Uchino K. Cerebral microvascular injury in patients with left ventricular assist device: a neuropathological study. *Transl Stroke Res*. 2022 Apr;13(2):257-264. *Data analysis and manuscript revision*
71. Wildi K, Li Bassi G, Barnett A, Panigada M, Colombo SM, Bandera A, Muscatello A, McNicholas B, Laffey JG, Battaglini D, Robba C, Torres A, Motos A, Luna CM, Rainieri F, Hodgson C, Burrell AJC, Buscher H, Dalton H, **Cho SM**, Choi H, Thomson D, Suen J, Fraser JF. Design and rationale of a prospective international follow-up study on intensive care survivors of COVID-19: The Long-Term Impact in Intensive Care Survivors of Coronavirus Disease-19-AFTERCOR. *Front Med (Lausanne)*. 2021; 8:738086. *Data contribution and manuscript revision*
72. [Kannapadi NV](#), [Jami M](#), [Premraj L](#), [Etchill EW](#), [Giuliano K](#), Bush EL, Kim BS, Seal S, Whitman G, **\*Cho SM**. Neurological complications in COVID-19 patients with ECMO support: a systematic review and meta-analysis. *Heart Lung Circ*. 2022 Feb;31(2):292-298.
73. [Kannapadi NV](#), [Jami M](#), [Premraj L](#), [Etchill EW](#), [Giuliano K](#), Bush EL, Kim BS, Seal S, Whitman G, **\*Cho SM**. Neurologic injury in patients with COVID-19 who receive VV-ECMO therapy: a cohort study. *J Cardiothorac Vasc Anesth*. 2021; 35:3456-3461.
74. [Ong CS](#), [Etchill E](#), Dong J, [Shou BL](#), Shelley L, [Giuliano K](#), Al-Kawaz M, Ritzl EK, Geocadin RG, Kim BS, Bush EL, Choi CW, Whitman G, **\*Cho SM**. Neuromonitoring detects brain injury in patients receiving extracorporeal membrane oxygenation support. *J Thorac Cardiovasc Surg* . 2021 Oct 30;S0022-5223(21)01508-7.

75. Savarraj JP, Burkett AB, Hinds SN, Paz AS, Assing A, Juneja S, Colpo GD, Torres LF, **Cho SM**, Gusdon AM, McCullough LD, Choi HA. Pain and other neurological symptoms are present at 3 months after hospitalization in COVID-19 patients. *Front Pain Res.* 2021;2(92). *Data analysis and manuscript revision*
76. Fan TH, Huang M, Gedansky A, Price C, Robba C, Hernandez AV, **\*Cho SM**. Prevalence and outcome of acute respiratory distress syndrome in traumatic brain injury: a systematic review and meta-analysis. *Lung.* 2021; 199:603-610.
77. **ISARIC Clinical Characterisation Group**. Ten months of temporal variation in the clinical journey of hospitalized patients with COVID-19: An observational cohort ISARIC. *Elife.* 2021 Nov 23;10:e70970. *Data contribution and manuscript revision*
78. Magid-Bernstein JR, Li Y, **Cho SM**, Piran PJ., Roh DJ, Gupta A, Shoamanesh A, Merkler A, Zhang C, Avadhani R, Montano N, Iadecola C, Falcone G, Sheth K, Qureshi A, Rosand J, Goldstein J, Awad I, Hanley D, Kamel H, Ziai WC, Murthy SB. Cerebral microbleeds and acute hematoma characteristics in the ATACH-2 and MISTIE III trials. *Neurology* . 2022 Mar 8;98(10):e1013-e1020. *Data / neuroimaging collection, analysis and manuscript revision*
79. Savarraj JP, Park ES, Colpo GD, Hinds SN, Morales D, Ahnstedt H, Paz AS, Assing A, Liu F, Juneja S, Kim E, **Cho SM**, Gusdon AM, Dash P, McCullough LD, Choi HA. Brain injury, endothelial injury and inflammatory markers are elevated and express sex-specific alterations after COVID-19. *Journal of Neuroinflammation.* 2021; 18(1):277. *Data analysis and manuscript revision*
80. Al-Kawaz MN, Shou Ben, Whitman G, Geocadin RG, **\*Cho SM**. Mild Hypothermia and Neurologic Outcomes in Patients undergoing Venoarterial Extracorporeal Membrane Oxygenation. *Journal of Cardiac Surgery.* 2022.
81. **\*\*Yu Guo**, **\*\*Cho SM**, Wei Z, Wang Q, Modi H, Gharibani P, Thakor N, Geocadin R. Early Thalamocortical Reperfusion Leads to Neurologic Recovery in a Rodent Cardiac Arrest Model. *Neurocritical Care.* 2022. **\*\*Contributed as co-first authors.**
82. **ISARIC Clinical Characterisation Group**. Association of body mass index with COVID-19 related in-hospital death. *lin Nutr.* 2022 Jan 29:S0261-5614(22)00026-7. doi: 10.1016/j.clnu.2022.01.017. *Data collection/contribution and manuscript revision*
83. Shou B, Al-Kawaz MN, Ong CS, Zhou AL, Dong J, Etchill E, Giuliano K, Choi CW, Kim BS, Bush E, Whitman G, **\*Cho SM**. Arterial Carbon Dioxide and Acute Brain Injury in Venoarterial Extracorporeal Membrane Oxygenation. *ASAIO J.* 2022.
84. Hwang J, Bronder J, Martinez NC, Geocadin RG, Kim BS, Bush EL, Whitman G, Choi CW, **\*\*Ritzl EK**, **\*\*Cho SM**. Continuous Electroencephalography Markers of Prognostication in Comatose Patients on Extracorporeal Membrane Oxygenation. *Neurocritical Care.* 2022. **\*\*Contributed as co-senior authors.**
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91. **Cho SM**, [Wilcox C](#), Keller S, [Acton M](#), [Rondo H](#), [Etchill E](#), [Giuliano K](#), Bush B, Sair HI, Pitts J, Kim BS, Whitman G. Assessing the SAFETY and FEasibility of bedside portable low-field brain Magnetic Resonance Imaging in patients on ECMO (SAFE-MRI ECMO study) – Study Protocol and First Experience. Crit Care. 2022.
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100. Carlson J, [Etchill E](#), Choi CW, Kim BS, Geocadin R, Whitman GR, **\*\*Cho SM** Early Withdrawal of Life Sustaining Therapy in Extracorporeal Cardiopulmonary Resuscitation (ECPR): Results from the Extracorporeal Life Support Organization Registry. Resuscitation. 2022 Aug 4;179:71-77.
101. **\*Cho SM**, White N, Premraj L, Battaglini D, Fanning J, Suen J, Bassi GL, Fraser JF, Robba C, Griffiee M., Singh B, Citarella BW, Merson L, Solomon T, Thomson D, **ISARIC Clinical Characterisation Group**. Neurological Manifestations of COVID-19 in Adults and Children. Brain. 2022 Sep 10;awac332. doi: 10.1093/brain/awac332.
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#### Review Articles [RA]

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4. [Hassett C](#), [Gedansky A](#), Uchino K, **\*Cho SM**. Neurological complications of COVID-19. *Cleve Clin J Med*. 2020;87(12):729-734.
5. Chiarini G, **Cho SM**, Whitman G, Rasulo F, Lorusso R. Brain injury in extracorporeal membrane oxygenation: a multidisciplinary approach. *Semin Neurol*. 2021;41(4):422-436.
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7. [Huang M](#), [Gedansky A](#), [Hassett CE](#), Price C, [Fan TH](#), Stephens RS, Nyquist P, Uchino K, **\*Cho SM**. Pathophysiology of brain injury and neurological outcome in acute respiratory distress syndrome: a scoping review of preclinical to clinical studies. *Neurocrit Care*. 2021;35(2):518-527.
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9. Bronder J, **Cho SM**, Geocadin R, Ritzl E. Revisiting EEG as part of the multidisciplinary approach to post cardiac arrest. *Resusc Plus* . 2021 Dec 16;9:100189. *Study design and manuscript revision*
10. [Fan T](#), [Solnick V](#), **\*Cho SM**. Treating the body to prevent brain injury: lessons learnt from the Covid-19 pandemic. *Curr Opin Crit Care*. 2022 Apr 1;28(2):176-183.
11. [Premraj L](#), [Kannapadi N](#), Briggs J, Seal SM, Battaglini D, Fanning J, Suen JY, Robba C, Fraser J, **\*Cho SM**. Mid and Long-term Neurological and Neuropsychiatric Manifestations of Post-COVID-19 Syndrome: A Meta-analysis - *J Neurol Sci*. 2022 Mar 15;434:120162.
12. [Al-Kawaz MN](#), **Cho SM**, Suarez J, Rivera-Lara L. Impact of Cerebral Autoregulation Monitoring in Cerebrovascular Disease, a systematic review. *Neurocrit Care*. 2022 Jun;36(3):1053-1070. *Study design and manuscript revision*



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14. Crow J, Lindsley J, **Cho SM**, Wang J, Lantry JH, Kim BS, Tashsili-Fahadan P. Analgo-sedation in Critically Ill Adults Receiving Extracorporeal Membrane Oxygenation Support. *ASAIO J*. 2022 May 20. *Study concept, design and manuscript revision*
15. Hwang J, **Cho SM**, Ritzl E. Recent Applications of Quantitative Electroencephalography in Adult Intensive Care Units – A Comprehensive Review. *J Neurol*. 2022 Aug 19. doi: 10.1007/s00415-022-11337-y.
16. Shaurya T, **Cho SM**, Steven RD. Mechanical ventilation in patients with traumatic brain injury: is it so different?"Mechanical ventilation in patients with traumatic brain injury: is it so different?" *Neurocrit Care*. 2022 Sep 7. doi: 10.1007/s12028-022-01593-1. Online ahead of print. *Study concept, design and manuscript revision*
17. Humayun M, Premraj L, Shah VA, **\*Cho SM**. Mechanical Ventilation in Acute Brain Injury Patients with Acute Respiratory Distress Syndrome. *Front Med*. 2022.
18. Shoskes A, Fan T, Starling RC, **\*Cho SM**. Neurological Complications of LVAD. *Can J Cardiol*. 2022.

#### Case Reports [CR]

1. **\*Cho SM**, Zeft A, Knight EP, Kotagal P, Wyllie E, Moosa ANV. Refractory status epilepticus secondary to atypical Rasmussen encephalitis successfully managed with aggressive immunotherapy. *Neurol Clin Pract*. 2017;7(1):e5-e8.
2. **\*Cho SM**, MacDonald S, Frontera JA. Coxsackie B3/B4-related acute flaccid myelitis. *Neurocrit Care*. 2017;27(2):259-260.
3. **\*Cho SM**, Mays MA. Restricted diffusion MRI lesions in HIV-associated CMV Encephalitis. *Neurohospitalist*. 2018;8(1):NP3-NP4.
4. **\*Cho SM**, Di Lorenzo R, Mathew J, and Buletko AB. Rare cause of Horner syndrome in Loews–Dietz syndrome. *Neurology*. 2017;89(14):e174-e175.
5. **\*Cho SM**, Buletko AB, Patel P, Cerejo R, and Bain M. A case of dural arteriovenous fistula mimicking a cerebellar tumor. *Neurohospitalist*. 2018;8(3):158-159.
6. **\*Cho SM**, Di Lorenzo R, Myles JL, Uchino K. Severe hyperhomocysteinemia manifesting as moyamoya vasculopathy and Henoch-Schonlein purpura. *Neurology*. 2018;91(7):321-323.
7. **\*Cho SM**, Ling G, Rivera-Lara L. Cerebral microhemorrhages and cerebral fat embolism in hemoglobin S-C disease. *Neurol Clin Pract*. 2019;9(2):e13-e14.
8. Gusdon AM, **Cho SM**, Mayasi Y, Malani R, Püttgen HA, Duffield A, Bolaños-Meade J, Lim M. Chronic lymphocytic leukemia resulting in hemorrhagic brain masses after sepsis. *Neurohospitalist*. 2020;10(1):64-68. *Data collection and manuscript revision*
9. **\*Cho SM**, Kilic A, Dodd-o JM. Incomplete Cushing’s reflex in extracorporeal membrane oxygenation. *Int J Artif Organs*. 2020;43(6):401-404.
10. Sullinger D, **Cho SM**, Farrokh S. Prolonged intra-sinus alteplase infusion in severe case of CVST. *J Pharm Pract* . 2022 Feb;35(1):140-147. *Data collection and manuscript revision*
11. Caturegli G, Crane M, Etchill E, Giuliano K, Nguyen M, Philosophe B, **Cho SM**, Wittstein I, Whitman G. Stress-induced (Takotsubo) cardiomyopathy after liver transplant rescued with venoarterial extracorporeal membrane oxygenation. *ASAIO J*. 2022 Apr 1;68(4):e66-e68. *Data collection and manuscript revision*
12. Farrokh S, Kim BS, **\*Cho SM**. Ketamine Infusion for Sedation in a Patient on Extracorporeal Membrane Oxygenation (ECMO). *Perfusion*. 2022.

#### Book Chapters, Monographs [BC]

1. Zhang L, Uchino K, CW Choi, **\*Cho SM**. Cerebrovascular complications of infective endocarditis: A review of contemporary insights and unsettled debates. In: Kilic A (ed) *Infective Endocarditis: A Multidisciplinary Approach*. Academic Press, 2021; Chapter 4.
2. Hassett C, **Cho SM**, Suarez JI. Tachyarrhythmias and neurologic complications. In José Biller (ed) *Handbook of Clinical Neurology*. Elsevier, 2021;177:151-162. *Study concept, outline, and manuscript revision*
3. Rando H, **Cho SM**, Camboni D, Mazzeffi M. Complications, Follow-up, and Outcomes of Adults with Cardiac Failure. *The ELSO Redbook 6<sup>th</sup> Edition*, 2022. *Study concept, outline, and manuscript revision*
4. Premraj L, Arora RC, **\*Cho SM**. The Neuropathogenesis and Neurological Manifestations of SARS-CoV-2. *COVID-19 Critical and Intensive Care Medicine Essentials*. 2022.
5. Hwang J, Kim BS, Terhani A, **\*Cho SM**. Management of neurological complications. *Critical and Intensive Care Medicine Essentials*. 2022.

Books, Textbooks [BK] None

#### Editorials [ED]

1. **\*Cho SM**, Ritzl EK. Neurological prognostication using electroencephalogram in adult veno-arterial extracorporeal membrane oxygenation: Limitations and recommendations. *Neurocrit Care*. 2020;33(3):652-654.
2. Geocadin R, **\*Cho SM**. Is neuromonitoring the key for better outcome in post-cardiac arrest syndrome? *Crit Care Med*. 2021;49(8):1369-1371.

Guidelines/Protocols, Consensus Statement, Expert Opinion, Consortium Articles [GL] None

#### Letters, Correspondence [LT]

3. **\*Cho SM**, Mulder M, Geocadin RG. Early electroencephalogram for neurologic prognostication: A self-fulfilling prophecy? *Ann Neurol*. 2019;86(3):473-474.
4. **\*Cho SM**, Di Lorenzo R, Myles JL, Uchino K. Author response: Severe hyperhomocysteinemia manifesting as moyamoya vasculopathy and Henoch-Schonlein purpura. *Neurology*. 2019;92(23):1120.
5. **\*Cho SM**, Farrokh S, Whitman G, Bleck TP, Geocadin RG. Determination of brain death in patients on ECMO. *Crit Care Med*. 2020.
6. Rice CJ, Moore NZ, Bain MD, **Cho SM**, Witek AM, Uchino K. In reply: Early versus delayed extracranial-intracranial bypass surgery in symptomatic atherosclerotic occlusion. *Neurosurgery*. 2020;87(1):E87. *Manuscript revision*
7. Uchino K, **\*Cho SM**. Letter by Uchino and Cho regarding article, "Infarction of the splenium of the corpus callosum in the age of COVID-19: A snapshot in time". *Stroke*. 2020;51(12):e380.
8. Shoskes A, Migdady I, Rice C, Hassett C, Deshpande A, Price C, Hernandez AV, **\*Cho SM**. Authors Reply: Brain injury is more common in venoarterial extracorporeal membrane oxygenation than venovenous extracorporeal membrane oxygenation: A systematic review and meta-analysis. *Crit Care Med*. 2021;49(3):e344-e345.
9. **\*Cho SM**, Farrokh S, Whitman G, Bleck TP, Geocadin RG. What do we really know about the timing and mechanism of intracranial hemorrhage in patients with VV-ECMO? *Crit Care Med*. 2020.
10. Hwang J, Geocadin R, Ritzl E, **\*Cho SM**. Continuous EEG in patients with extracorporeal membrane oxygenation support: clinical need in multidisciplinary collaboration and standardized monitoring. *J Neurol*. 2022. *Manuscript revision*
11. Crow J, Lindsley J, **Cho SM**, Wang J, Lantry JH, Kim BS, Tashsili-Fahadan P. Analgosedation in Critically Ill Adults Receiving Extracorporeal Membrane Oxygenation Support – Response to the Letter. *ASAIO J*. 2022. *Manuscript revision*

#### Research Letters/White Papers/Brief Reports [RL]

1. **\*Cho SM**, Ziai W, Geocadin R, Choi C, Whitman G. Arterial-sided oxygenator clot and transcranial Doppler ultrasound emboli in venoarterial extracorporeal membrane oxygenation. *Ann Thorac Surg*. 2019;107(1):326-327.
2. Zawar I, **Cho SM**, Prayson R, Levin K. Primary central nervous system lymphoma mimicking herpes encephalitis. *Neurooncol Pract*. 2021;8(5):620-622. *Manuscript revision*
3. Peeler A, Gleason KT, Ferrell B, Battista V, Klindinst R, **Cho SM**, Davidson PM. Extracorporeal membrane oxygenation: opportunities for expanding nurses' roles. *AACN Adv Crit Care*. 2021;32(3):341-345. *Manuscript revision*

## FUNDING

### EXTRAMURAL Funding

#### Research Extramural Funding

##### Current

12/1/20–12/31/22	Long-term Impact in Intensive Care Survivors of Coronavirus Disease-19 (AFTERCOR) Study Gilead Grant \$250,000 Role: PI (2%)
9/19/19–8/31/23	Plasma Biomarker of Brain Injury in ECMO Extracorporeal Life Support Organization Annual Grant

	\$5,000 Role: PI (no salary support)
9/19/19–8/31/24	Influence of Cooling Duration on Efficacy in Cardiac Arrest (ICECAP trial) 1UG3HL145269-01A1 NIH/NLHBI \$4,438,938 PI: Romer Geocadin Role: ICU Site PI for JHH (2%)
7/1/21–5/31/23	SAfety and FEAsibility of portable Magnetic Resonance Imaging in ECMO (SAFE MRI) Hyperfine Grant \$100,000 Role: PI (4%)
1/1/22–12/31/26	CLots and Oxygen in Va-Extracorporeal membrane oxygenation (CLOVER) Study NIH NHLBI 1K23HL157610 \$880,419 Role: PI (75%)
7/1/22–6/30/24	CLots and Oxygen in Va-Extracorporeal membrane oxygenation (CLOVER) Study NHLBI Loan Repayment Program \$100,000 Role: PI (no salary support)
<b>Pending</b>	
9/1/23–8/31/25	Assessment of Acute Brain Injury after Rapid Reduction of PaCO <sub>2</sub> upon ECMO Cannulation using Portable MRI and Biomarkers (DELTA ECMO-ABI) Study NIH NINDS \$280,000 Role: PI (10%)
<b>Previous</b>	
7/1/20–6/30/22	Non-invasive Neurological Monitoring of Patients With ECMO NINDS Loan Repayment Program \$100,000 Role: PI (no salary support)

## **INTRAMURAL Funding**

### **Research Intramural Funding**

#### **Current**

8/1/21–12/31/22	Multidisciplinary ECMO Research COVID-19 Bridge Grant \$50,000 Role: PI (no salary support; salary for post-doctoral fellow)
9/1/21–12/31/22	Long-term Impact in Intensive Care Survivors of Coronavirus Disease-19 (AFTERCOR) Johns Hopkins BOOST \$15,000 (Clinical Research Unit Expenses) Role: PI (no salary support)
7/1/22–6/30/23	Cerebral Autoregulation and Brain Tissue Oxygenation in ECPR Johns Hopkins INSPIRE Award \$20,000 Role: co-PI (PI: Bo Soo Kim, no salary support)

Pending	None
Previous	
6/1/19–5/31/20	Transcranial Doppler Ultrasound Microembolic Signal and ECMO Circuit Clots “Sower” Johns Hopkins Neuroscience Critical Care Grant \$5,000 Role: PI (no salary support)
6/1/19–5/31/20	Johns Hopkins Anesthesia and Critical Care Medicine T32 Institutional Grant 5T32GM075774-14 NIH \$60,000 PI: Allan Gottschalk Role: Fellow
1/1/20–12/31/21	Cerebral Autoregulation and Brain Injury in ECPR – Swine Model Magic That Matters Johns Hopkins Cardiac Surgery Grant \$71,410 Role: PI (no salary support)
1/1/21–12/31/21	Brain Autopsy in COVID-19 ARDS - Multicenter Study “Sower” Johns Hopkins Neuroscience Critical Care Grant \$5,000 Role: PI (no salary support)
1/1/22–7/31/22	CLots and Oxygen in Va-Extracorporeal membrane oxygenation (CLOVER) Study Johns Hopkins Clinician Scientist Award \$80,000 Role: PI (75%)

## CLINICAL ACTIVITIES

### Clinical Focus

1. Neurocritical Care, Stroke, Acute Brain Injury, Mechanical Circulatory Support Devices, Neurocardiology
2. I am extensively involved in neurologic outcomes reporting for patients with left ventricular assist device (LVAD) and extracorporeal membrane oxygenation (ECMO). I run neurocritical care consultation of ECMO patients at the Johns Hopkins Hospital (JHH). I run morbidity and mortality with Dr. Bo Soo Kim, an intensivist in the CVISCU. I lead ECMO research efforts as Director of Adult ECMO Research in the Division of Cardiac Surgery at JHH. I am the JHH intensive care unit PI of the ICECAP trial. I was involved with the ENDURANCE trials for analyzing risk factors, mechanisms, and long-term cognition outcome with Medtronic. My effort in studying different stroke risk for HVAD vs. HM3 through the INTERMACS registry analysis led to a cessation of HVAD production in the market by the FDA (June 2021).

### Certification

#### Medical, other state/government licensure

6/17–present Maryland (#H83673)

#### Boards, other specialty certification

2017–present Board Certified, American Board of Psychiatry and Neurology #60646

2022–present Board Certified, American Board of Neurocritical Care

### Clinical (Service) Responsibilities

2018–2019 Neurology residents’ lumbar puncture clinic, Preceptor, monthly, Johns Hopkins Neurology Outpatient Center

2019–present Inpatient Neurocritical Care Service, Attending Physician, 8-10 weeks each year, Johns Hopkins Hospital

2019–present Inpatient Neurocritical Care Service, Attending Physician, 2-4 weeks each year, Johns Hopkins Bayview Hospital

### Clinical Productivity

2019–present My clinical effort assignment is 15%.

Clinical Draw from outside local/regional area None

Membership in or examiner for specialty board None

Clinical Program Building / Leadership None

Clinical Demonstration Activities to external audience, on or off campus None

Development of nationally/internationally recognized clinical standard of care None

## EDUCATIONAL ACTIVITIES

### Educational Focus

My educational focus is on acute brain injury and its management. In particular, I am interested in educating clinicians on how to manage acute brain injury in patients with mechanical circulatory device support.

### Teaching

#### Classroom instruction

##### JHMI/Regional

2015-2017 Lecturer, Neurology resident lecture series, given yearly to neurology house staff, “Intracerebral Hemorrhage,” “Anticoagulation Reversal Agents,” “Silent Cerebral Infarcts and Cognitive Outcome,” Cleveland Clinic, OH

2016-2017 Lecturer, Internal Medicine resident lecture series, “Acute Ischemic Stroke Management,” given yearly to neurology house staff, Cleveland Clinic, OH

2018-present Lecturer, Neurology resident lecture series, given yearly to neurology house staff, “Acute Brain Injury and Neurologic Complication in Patients with LVAD,” “Acute Brain Injury in Patients with ECMO,” 2019-present “Intracerebral Hemorrhage,” Johns Hopkins Hospital, Baltimore, MD

2019-present Lecturer, Neurocritical fellow lecture series, “Current Practice of ARDS: An Update,” “Brain Injury with Patients with Cardiac Devices,” “Anticoagulation Reversal Agents,” “Neurological Complications of ECMO,” given Johns Hopkins Hospital, Baltimore, MD

National None

International None

#### Clinical instruction

##### JHMI/Regional

2018-2019 Preceptor, Neurology residents’ lumbar puncture clinic, monthly, Johns Hopkins Neurology Outpatient Center, Baltimore, MD

2019-present Attending Physician, Inpatient Neurocritical Care Service, 8-12 weeks each year, Johns Hopkins Hospital, Baltimore, MD

2019-present Attending Physician, Inpatient Neurocritical Care Service, 2-4 weeks each year, Johns Hopkins Bayview Hospital, Baltimore, MD

National None

International None

CME instruction None

Workshops / seminars None

### Mentoring

#### Pre-doctoral Advisees / Mentees

2018-present Giorgio Caturegli, MD candidate, medical student. Current position: General surgery resident, Yale University School of Medicine, Baltimore, MD. OR 29, 34, 36, 43, 50, 51, 53, 62, 99, 103, 106, 110; CR 11

2018-present Megan Hunt, MD candidate, medical student. Current position: medical student, Johns Hopkins

University, Baltimore, MD. Coauthored articles OR 41, 42

2018-present Nivedha Kannapadi, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD. Coauthored articles OR 39, 51, 53, 60, 72, 73, 105, 106; RA 11, 13

2020-present Benjamin Shou, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD. Coauthored article OR 74, 80, 83, 96, 103, 107

2020-present Rochelle Prokupets, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD. OR 106

2020-present Lavienraj Premraj, MD PhD candidate, medical student. Current position: medical student, Griffin University Medicine, Queensland, Australia. Coauthored articles OR 60, 61, 72, 73, 85, 93, 97, 101, 107; RA 11, 13, 17

2021-present John Ma, BS candidate. Current position: undergraduate student in computer engineering, New York University, New York, NY.

2021-present David Zhou, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

2021-present Jacob Roberts, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

2022-present Shrey Kapoor, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

2022-present Henry Su, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

2022-present Albert Leng, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

2022-present Arjun Menta, MD candidate, medical student. Current position: medical student, Johns Hopkins University, Baltimore, MD.

#### Post-doctoral Advisees / Mentees

2016-2018 Cory Rice, MD, neurology resident. Current position: vascular neurologist, University of Tennessee, Chattanooga, TN. Coauthored articles OR 8, 9, 12, 14-16, 24, 26, 28, 31, 35, 38; LT 4, 8

2017-2019 Tiffany Lee, MD, neurology resident. Current position: neuromuscular fellow, Cleveland Clinic, Cleveland, OH. Coauthored articles OR 11, 22

2017-present Ibrahim Migdady, MD, neurology resident. Current position: Assistant Professor, Albert Einstein College of Medicine. Coauthored articles OR 15, 26, 28, 30-32, 35, 47, 49, 52, 54, 59, 66; LT 8

2017-present Tracy Fan, DO, neurology resident. Current position: neurocritical care fellow, Massachusetts General Hospital, Boston, MA. Coauthored articles OR 32, 45, 70, 76; RA 7, 10, 13, 18;

2017-present Catherine Hassett, DO, neurology resident. Current position: Faculty at the Cleveland Clinic, Cleveland, OH. Coauthored articles OR 14, 15, 26, 28, 32, 35, 47, 49, 52, 70; RA 4, 7; LT 8

2018-present Lucy Q. Zhang, MD, neurology resident and neurocritical care fellow. Current position: Attending Physician at INOVA, Fairfax, VA. OR 8, 9, 15, 16, 38, 103, 105; BC 1

2019-present Julia Carlson, MD, neurology resident. Current position: Assistant Professor at University of North Carolina. Coauthored article OR 56, 100

2019-present Aaron Shoskes, DO, neurology resident. Current position: neurology resident, Cleveland Clinic, Cleveland, OH. Coauthored articles OR 35, 45, 47, 49, 52, 59, 66, 87, 98; RA 6, 18; BK 8

2020-present Jaeho Hwang, MD, MPH, neurology resident, Current position: neurology resident, Johns Hopkins, Baltimore, MD. Coauthored article OR 50, 84; RA 15; BC 5; LT 10

2020-present Clotilde Balucani, MD, PhD, neurocritical care fellow. Current position: Neurointensivist at NYU. Coauthored article OR 53

2020-present Mais Al-Kawaz, MD, neurocritical care fellow. Current position: Neurosurgical Interventional fellow, Mt Sinai Hospital, New York, NY. OR 53, 74, 80, 83; RA 12

2020-present Lindsay Law, MD, neurocritical care fellow. Current position: neurocritical care fellow, Johns Hopkins, Baltimore, MD.

2020-present Veronika Solnicki, MD, neurocritical care fellow. Current position: neurocritical care fellow, Johns Hopkins, Baltimore, MD. RA 10

2020-present Merry Huang, MD, neurology resident. Current position: neurology resident, Cleveland Clinic,

	Cleveland, OH. Coauthored articles OR 59, 76; RA 7
2020-present	Aron Gedansky, MD, neurology resident. Current position: neurology resident, Cleveland Clinic, Cleveland, OH. Coauthored articles OR 76; RA 4, 7
2020-present	Eric Etchill, MD, MPH, surgery resident. Current position: general surgery resident, Johns Hopkins, Baltimore, MD. Coauthored articles OR 43, 44, 48, 56, 60, 63, 72-74; CR 11
2020-present	Kate Giuliano, MD, surgery resident. Current position: general surgery resident, Johns Hopkins, Baltimore, MD. Coauthored articles OR 43, 48, 60, 63, 72-74; CR 11
2020-present	Chin Siang Ong, MD, PhD, post-doctoral fellow. Current position: post-doctoral fellow, Johns Hopkins, Baltimore, MD. Coauthored articles OR 63, 74, 83, 96, 107
2020-present	Christopher Wilcox, DO, MS, post-doctoral fellow. Current position: Intensivist, University of Buffalo, Buffalo, NY. Coauthored articles OR 48, 91, 96, 108; RA 8
2020-present	Enoch Yeng, MS, PhD candidate. Current position: Master's student, Johns Hopkins University Biomedical Engineering, Baltimore, MD.
2020-present	Anna Peeler, RN, PhD candidate. Current position: PhD student, Johns Hopkins University Johns Hopkins Bloomberg School of Public Health, Baltimore, MD. Coauthored articles OR 56; RL 3
2021-present	Yucheng Shen, MS, PhD candidate. Current position: Master's student, Johns Hopkins University Biomedical Engineering, Baltimore, MD.
2021-present	Henry Chang, MD, PhD, neurocritical care fellow. Current position: neurocritical care fellow, Johns Hopkins, Baltimore, MD. OR 106
2021-present	Lindsay Laws, MD, neurocritical care fellow. Current position: Swedish Neuroscience Institute, Seattle, WA. OR 105
2021-present	Alex Feng, MD, PhD, neurocritical care fellow. Current position: neurocritical care fellow, Johns Hopkins, Baltimore, MD.
2021-present	Mariyam Humayun, MD, neurocritical care fellow. Current position: neurocritical care fellow, Johns Hopkins, Baltimore, MD. RA 17.
2021-present	Hannah Rando, MD, MPH, post-doctoral cardiac surgery fellow. Current position: post-doctoral cardiac surgery fellow, Johns Hopkins, Baltimore, MD. OR 102, 108.
2022-present	Luke Kang, MD, post-doctoral cardiac surgery fellow. Current position: post-doctoral cardiac surgery fellow, Johns Hopkins, Baltimore, MD. OR109.
2022-present	Ifeanyi David Chinedozi, MD, post-doctoral cardiac surgery fellow. Current position: post-doctoral cardiac surgery fellow, Johns Hopkins, Baltimore, MD.
2022-present	Zachary Darby, MD, post-doctoral cardiac surgery fellow. Current position: post-doctoral cardiac surgery fellow, Johns Hopkins, Baltimore, MD.
2022-present	Shivalika Khanduja, MBBS, research fellow. Current position: research fellow for the HERALD group, Johns Hopkins, Baltimore, MD.

#### Thesis committees

2020-2022 Anna Peeler, RN, PhD – thesis committee for palliative care in patients with ECMO.

Educational Program Building / Leadership None

Educational Demonstration Activities to external audience on or off campus None

## RESEARCH ACTIVITIES

### Research Focus

- Acute brain injury in cardiovascular diseases
- Stroke in patients with a left ventricular assist device (LVAD)
- Acute brain injury in patients receiving extracorporeal membrane oxygenation (ECMO)
- Cerebral autoregulation in swine ECPR (co-PI with Steve Keller)
- Neurological complications and outcomes of patients with COVID-19
- Neurological complications and outcomes of patients with ARDS
- Long-term neurological outcome in ECMO patients
- Subarachnoid hemorrhage
- Intracerebral hemorrhage

- Multicenter Observational Study on Practice of Ventilation in Brain Injured Patients (VENTIBRAIN) – JHH Site PI (2022-2023)
- Outcome Prognostication of Acute Brain Injury using the Neurological Pupil Index (ORANGE) study: protocol for a prospective, observational, multicentre, international cohort study – JHH Site PI (2022-2023)

#### Research Program Building / Leadership

1/20–present Director of ECMO research in Cardiac Surgery, Johns Hopkins University School of Medicine.  
I am responsible for monthly ECMO research meetings and monthly ECMO M&M.

Research Demonstration Activities to external audience, on or off campus None

Inventions, Patents, Copyrights None

Technology Transfer Activities None

### SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES

None

### ORGANIZATIONAL ACTIVITIES

#### Institutional Administrative Appointments

2020–present Co-chair, Neurological Sub-study of International COVID-19 Critical Care Consortium, Critical Care Research Group

2021-2022 Member, Compensation Plan Committee, Johns Hopkins Anesthesiology, and Critical Care Medicine (ACCM)

2022-present Member, Neuro “Just Say Yes” – Lifeline Response workforce – JHH Neurology, Neurosurgery, and Neuroscience Critical Care Triage

#### Editorial Activities

##### Editorial board appointments

11/20 Guest Editor, Seminars in Neurology “Neurology of Cardiovascular Disease”

3/21 Review Editor, Frontiers in Physiology “Clinical and Translational Physiology”

#### Journal peer review activities

2016-present Stroke  
2016-present Journal of the American Heart Association  
2017-present Neurocritical Care  
2017-present Cerebrovascular Diseases  
2018-present Critical Care  
2018-present Neurosurgery  
2018-present ASAIO Journal  
2018-present International Journal of Artificial Organs  
2018-present Journal of Heart and Lung Transplantation  
2018-present Journal of Critical Care  
2019-present Critical Care Medicine  
2019-present Journal of Neurology  
2019-present Circulation  
2020-present Journal of Neurology and Neurosurgery  
2020-present Nature  
2020-present Translational Stroke Research  
2020-present Journal of Viral Hepatitis  
2020-present PLOS One  
2021-present JACC

#### Other peer review activities [non medico-legal]

2019-present Abstract reviewer, International Heart and Lung Transplantation Meeting

2022-present Grant Reviewer, Johns Hopkins ACCM StAAR



### Advisory Committees, Review Groups / Study Sections

- 2020-present Co-Chair, Neurological Sub-study of Global COVID-19 Critical Care Consortium (CCCC) (Co-Chair: Chiara Robba), Critical Care Research Group
- 2020-present Member, Study steering committee, Long-term impAct in inTEnsive caRe survivors of CORonavirus Disease-19 (AFTERCOR), Critical Care Research Group
- 2020-present Chair, Neurological Study of COVID-19 in the ISARIC (International Severe Acute Respiratory and Emerging Infections Consortium) (Co-Chairs: David Thomson, Tom Solomon)
- 2022-2022 Reviewer for Study Section, University of California Irvine, Institute for Clinical and Translational Science (ICTS)
- 2022-present Member, Scientific Oversight Committee, Extracorporeal Life Support Organization (ELSO)

### Professional Societies

- 2013-present Member, American Academy of Neurology
- 2014-present Member, American Stroke Association/ American Heart Association
- 2015-present Member, Neurocritical Care Society
- 2018-present Member, International Heart and Lung Transplantation Society

Conference Organizer None

### Session Chair

- 2/9/23 “Cerebrovascular Complications of Cardiac Devices and Procedures,” International Stroke Conference, Dallas, TX.

Consultantships None

## RECOGNITION

### Awards, Honors

- 2004-2008 Dean’s List all quarters
- 2005 Outstanding sophomore, Department of Physics, University of Cincinnati
- 2005-2007 Scholarship, McMicken College of Arts and Science
- 2008 Magna cum laude in Physics (BS)
- 2008 Member, Phi Beta Kappa
- 2008 Member, Sigma Pi Sigma
- 2009-2013 OUCOM (Ohio University Medical School) Institutional Scholarship
- 2016 Clinical Poster Winner, 36th Annual Research Day, Cleveland Clinic
- 2016, 2017 Excellence in Teaching Award, Cleveland Clinic
- 2016-2017 Neurological Institute Education Chair
- 2017 Resident Teacher of the Year in Neurology, Cleveland Clinic
- 2018-2019 Chief Fellow, Johns Hopkins Neurocritical Care Division

### Invited Talks

#### JHMI/Regional

- 9/4/18 “Brain Injury in ECMO,” Cardiovascular Surgical ICU Conference, Johns Hopkins, Baltimore, MD
- 5/14/19 “Transcranial Doppler Microembolic Signal and Brain Injury in ECMO,” Van Praag Lecture at Johns Hopkins Cardiothoracic Annual Meeting, Baltimore, MD
- 10/20/20 “Neurological Complications in Continuous Flow Pumps: Translational and Clinical Research,” NCCU Faculty Research Presentation, Johns Hopkins, Baltimore, MD
- 10/20/20 “Updates on Therapeutic Hypothermia and Neurologic Prognostication in Cardiac Arrest Survivor: The ICECAP Trial,” Emergency Medicine Grand Rounds at the JHH, Baltimore, MD
- 10/22/20 “Updates on Therapeutic Hypothermia and Neurologic Prognostication in Cardiac Arrest survivor: The ICECAP Trial,” Neurology Grand Rounds at the JHH, Baltimore, MD
- 11/19/20 “Neurological Complications in Patients with LVAD and ECMO,” Neurology Grand Rounds at the JHH, Baltimore, MD
- 4/15/21 “The ICECAP Trial,” Emergency Medicine Grand Rounds at the JHH, Baltimore, MD
- 9/16/21 “Therapeutic Hypothermia and the ICECAP Trial in Cardiac Arrest,” ACCM Discovery Grand Rounds

at the JHH, Baltimore, MD

11/7/22 “Neurology of ECMO,” Johns Hopkins, Neurology Research Retreat, Baltimore, MD

#### National

5/9/17 “Neurological Complications in LVAD,” Grand Rounds at the Cleveland Clinic, Cleveland, OH  
4/27/20 “Neurologic Monitoring of Cardiac Surgery Patients,” 100<sup>th</sup> American Association for Thoracic Surgery, New York, NY  
9/23/20 “Continuous EEG for Neurological Monitoring of ECMO,” Annual Neurocritical Care Society Meeting (Virtual), Chicago, IL.  
11/2/20 “Neurological Complications in Patients on ECMO,” Grand Rounds at the INOVA, Fairfax, VA.  
4/20/21 “Neurological Complications and Management of Patients on ECMO” Neurology Grand Rounds at the Boston University  
4/30/21 “Mitigating Neurological Complication in Patients on ECMO,” 101<sup>st</sup> American Association for Thoracic Surgery, (Virtual), New York, NY  
1/29/22 “Brain Injury in ECMO: Cardinal considerations for initiation and management,” 58<sup>th</sup> Society of Thoracic Surgeons Conference, Miami, FL.  
5/4/22 “ECMO-associated ischemic and hemorrhagic strokes,” Neuroscience Grand Rounds, Stony Brook Medical Center, Stony Brook, NY  
5/16/22 Keynote Speaker, “The Role of Neurologists in Management of ECMO-associated Stroke,” The Parkview Health Stroke Annual Symposium, Fort Wayne, IN  
5/18/22 “Long-term Neuropsychiatric Outcome in COVID-19,” Loma Linda Internal Medicine Grand Rounds, Loma Linda, CA.  
7/14/22 “Neuroimaging and Acute Brain Injury in Patients with ECMO,” UT Houston Advanced Heart Failure Grand Rounds, Houston, TX.  
5/7/23 “Composition and Building of a Multi-Disciplinary Stroke Team,” The 103<sup>rd</sup> Annual American Association for Thoracic Surgery, Los Angeles, CA.  
5/10/23 Keynote Speaker, “Neurocritical of ECMO,” Annual Neurocritical Care Symposium, UT Houston, Houston, TX.

#### International

2/23/17 “Silent Infarcts in Carotid Interventions: CEA and CAS International Stroke Conference,” Houston, TX.  
1/24/18 “MRI Features of Infective Intracranial Aneurysms,” International Stroke Conference, Los Angeles, CA.  
4/12/19 “Understanding Risk Factors of Stroke in Patients with HVAD,” International Society of Heart and Lung Transplantation, Orlando, FL.  
7/23/19 “Brain Injury in Patients with Continuous Flow Pump,” University of Charité, Berlin, Germany  
7/24/19 “Neuromonitoring in Patients with ECMO Support,” IEEE Engineering in Medicine and Biology Society Meeting, Berlin, Germany  
2/20/20 “How Do We Improve Neurologic Outcome in Patients With ECMO?,” International Stroke Conference, Los Angeles, CA.  
4/28/20 “Neurocognitive Outcome in Patients with LVAD,” International Society of Heart and Lung Transplantation, Montreal, Canada  
10/15/20 “Long-term Neurological Effect of COVID-19 Infection,” European Society of Intensive Care Medicine (ESICM), Webinar, based out of Europe  
11/2020 “Neurological Complications of COVID-19 in ECMO Patients,” Korean Neurocritical Care Society Annual Conference (Virtual), Seoul, South Korea  
11/29/20 “Strokes in COVID-19,” European Society of Anesthesiology Annual Conference (Virtual), Belgium.  
5/7/21 “Acute Brain Injury and Neurological Complications of ECMO Patients,” Korean Critical Care Society Annual Conference, Seoul, South Korea  
9/3/21 “Management of Cerebral Edema in Ischemic Stroke,” ESICM – European Society of Care Intensive Medicine, Webinar.  
10/8/21 “Challenges in ECMO Nutrition,” Samsung Medical Center ICU Grand Rounds (Virtual), Seoul, South Korea.  
11/18/21 “Neuropathology of COVID-19,” Neuro Lil 2021 Conference (Virtual), Colombia.  
12/17/21 Keynote Speaker, “Management of Neurological Injury in VA-ECMO,” The 8<sup>th</sup> Annual Korean ECMO Symposium, Chonnam National University Hospital, Jeonbuk, South Korea.

- 2/11/22 Invited Symposium, “Neurocritical Care of Patients on Extra-Corporeal Membrane Oxygenation (ECMO),” International Stroke Conference, New Orleans, LA.
- 4/21/22 “Neurological Complications in COVID- 19 Patients with ECMO Support,” Panama International Critical Care Congress 2022, Panama City, Panama
- 4/22/22 “Management of ECMO Patients,” Panama International Critical Care Congress 2022, Panama City, Panama.
- 4/23/22 “Multimodality monitoring in Neurocritical care,” Panama International Critical Care Congress 2022, Panama City, Panama.
- 5/21/22 “Neurological Assessment and Care in Cardiogenic Shock,” Korea Cardiogenic Shock Annual Symposium 2022, Seoul, S. Korea.
- 9/9/22 “Neurological Complications in Patients with ECMO Support,” Chile Neurocritical Care Society Meeting 2022, Santiago, Chile.
- 9/9/22 “Hemodynamic Management of VSP and DCI in Subarachnoid Hemorrhage,” Chile Neurocritical Care Society Meeting 2022, Santiago, Chile.
- 9/9/22 “Use of IABP and ECMO in Subarachnoid Hemorrhage,” Chile Neurocritical Care Society Meeting 2022, Santiago, Chile.
- 10/18/22 “Neuroimaging in ECMO – Innovative Approach,” Critical Care Medicine Discovery Rounds, Hospital for Sick Children “SickKids”, Toronto, Canada.
- 11/12/22 Keynote Speaker, “Neuromonitoring and management of ECMO”, Korea ECMO Symposium, Ewha Women University School of Medicine, Seoul, South Korea.
- 4/21/23 “Neurological Prognosis and Management after ECPR”, Annual Conference, The Korean Society of Cardiology, Kimdaejung Convention Center, Gwangju, South Korea.

Visiting Professorships None