

**BIOGRAPHICAL SKETCH**

Provide the following information for the Senior/key personnel and other significant contributors.  
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Amit Ayer, MD

eRA COMMONS USER NAME (credential, e.g., agency login): AAYER1

POSITION TITLE: Fellow, Epilepsy, Stereotactic and Functional Neurological Surgery

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Queen's University Kingston, ON, Canada	BScH	05/2009	Life Sciences (Immunology)
Wake Forest School of Medicine Winston-Salem, NC	MD	05/2013	Medicine
Northwestern Kellogg School of Management Chicago, IL	MBA	12/2018	Health Enterprise, Entrepreneurship
Northwestern Memorial Hospital Chicago, IL	Residency	06/2020	Neurological Surgery
Stanford University	Fellowship	07/2020	Epilepsy, Stereotactic and Functional Neurosurgery

**A. Personal Statement**

I am a clinical fellow at Stanford University training in epilepsy, stereotactic and functional neurosurgery under the supervision of Dr. Jaimie Henderson. I attended Queen's University in Kingston, ON and received a Bachelor of Science in Life Sciences with an honors thesis in Immunology studying IL-27 cytokine signaling. I then attended Wake Forest School of Medicine in Winston-Salem, NC where I was awarded external funding to study neurovascular immunology at the Neurological Institute of Columbia University in New York, NY. My clinical training continued with neurosurgical residency at Northwestern Memorial Hospital and I also obtained a Master of Business Administration at Northwestern Kellogg School of Management in 2018. I have been awarded multiple research funding awards for projects I have been involved with during my residency.

My research interests focus on the application of emerging technology to neurosurgical care. My current primary focus centers on the care of hydrocephalic patients, where I was part of a team that developed a non-invasive sensor to monitor ventricular shunt function and subsequently led clinical studies on its efficacy. I also am interested in brain computer interface development and am a part of the Neuroprosthetics Translational laboratory at Stanford.

**B. Positions and Honors**

Fellow, Epilepsy, Stereotactic and Functional Neurosurgery, Stanford University Healthcare (06/2020-Present)  
Chief Resident, Neurosurgery, Northwestern Memorial Hospital (06/2019-06/2020)  
Neurosurgery Resident, Northwestern Memorial Hospital (06/2013-Present)  
Co-Founder, Rhaeos, Inc. (05/2018-Present)  
Co-Founder, Hubly, Inc. (06/2018-Present)  
Research Assistant, Miller Laboratory of Limb Motor Control (PI: Lee Miller, PhD; Northwestern University Department of Physiology, Chicago, IL, 02/2018-Present)  
Research Assistant, Center for Bio-integrated Electronics (PI: John A. Rogers, PhD; Northwestern University McCormick School of Engineering, Evanston, IL, 07/2016-Present)

Member, American Association of Neurological Surgeons (2013-Present)  
Member, Congress of Neurological Surgeons (2013-Present)  
Innovator of the Year Finalist – Rhaeos; the Wearable Shunt Monitor (Congress of Neurological Surgeons, Houston, TX, 10/2018)  
Winner (Third place overall, Life Sciences winner, Audience winner) – Rhaeos – (VentureCat Competition; Northwestern University, Evanston, IL, 05/2018)  
Winner – Hubly; A Novel Intracranial Access Solution (NUVention Medical Competition; Northwestern University, Evanston, IL, 03/2018)  
Research Assistant, Neurovascular Lab (PI: E. Sander Connolly, MD; Columbia University Department of Neurological Surgery, New York, NY, 04/2010-09/2010)  
Honors Thesis, Queen's University, Department of Microbiology and Immunology (PI: Katrina Gee, PhD)  
Dean's list, Queen's University (2009)  
Best Speaker, Queen's Model Parliament (2007)

### **C. Contributions to Science**

#### Patents:

*Wireless and Noninvasive Epidermal Electronics.*

Inventors: Rogers JA, **Ayer A**, Ray T, Gutruf P, Krishnan S. Provisional. Serial No: 62/650,826. March 30, 2018.

*System and Method for Integrated Surgical Guide-Hub and Drill with Guided Drilling and Plunge Protection*

Inventors: **Ayer A**, Andrews ND, Grage CM, Parekh NH. Provisional. Serial No: PCT/US19/63820. November 28, 2019.

#### Peer-Reviewed Publications

Abecassis ZA, **Ayer A**, Rehmani K, Murthy NK, Templer J, Tate MC. *Analysis of risk factors and clinical sequelae of direct electrical cortical stimulation–induced seizures and afterdischarges in patients undergoing awake mapping.* J Neurosurg. 2020. PMID: 32442979

Krishnan SR, Arafa HM, Kwon K, Deng Y, Su CJ, Reeder JT, Freudman J, Stankiewicz I, Chen HM, Loza R, Mims M, Mims M, Lee K, Abecassis Z, Banks A, Ostojich D, Patel M, Wang H, Börekçi K, Rosenow J, Tate M, Huang Y, Alden T, Potts MB, **Ayer AB\*\***, Rogers JA\*\*. *Continuous, noninvasive wireless monitoring of flow of cerebrospinal fluid through shunts in patients with hydrocephalus.* NPJ Digit Med. 2020 Mar 6;3:29. doi: 10.1038/s41746-020-0239-1. PMID: 32195364.

Abecassis ZA, Hopkins B, Win P, Yemeni K, Karras CL, Frankel HG, **Ayer A**, Dahdaleh NS. *Impact of medical student involvement on outcomes following spine surgery: A single center analysis of 6485 patients.* J Clin Neurosci. 2019 Aug 16. PMID: 31427233

Krishnan S\*, Ray T\*, **Ayer A\***, Ma Y, Gutruf P, Lee K, Lee J, Wei C, Feng X, Ng B, Abecassis ZA, Murthy NK, Stankiewicz I, Freudman J, Stillman J, Kim N, Young G, Goudeseune C, Ciraldo J, Tate MC, Huang Y, Potts MB, Rogers JA. *Epidermal electronics for noninvasive, wireless, quantitative assessment of ventricular shunt function in patients with hydrocephalus.* Science Translational Medicine. 2018 Oct;10(465). PMID: 30381410

Schumacher AJ, Lall RR, Lall RR, Nanney AD, **Ayer A**, Sejpal S, Liu BP, Marymont M, Lee P, Bendok BR, Kalapurakal JA, Chandler JP. *Low-Dose Gamma Knife Radiosurgery for Vestibular Schwannomas: Tumor Control and Cranial Nerve Function Preservation after 11 Gy.* J Neurol Surg. 2016. PMID: 28180036

**Ayer A**, Page BR, Lucas JT, Bourland D, Oliver ER, Tatter SB, Ellis TL, Chan MD. *Cavernous Sinus Metastases Treated with Gamma Knife Stereotactic Radiosurgery.* J Radiosurg SBRT. 2014. 3(2);131-137.

Abecassis IJ, Adel JG, **Ayer A**, Batjer HH. *A Ruptured Infectious Intracranial Aneurysm with a Combined Fungal and Bacterial Etiology.* Clin Neurol Neurosci. 2013. Sep 1. PMID: 24034820

**Ayer A**, Hwang BY, Appelboom G, Connolly ES. *Clinical Trials for Neuroprotective Therapies in Intracerebral Hemorrhage: A New Roadmap from Bench to Bedside.* Transl. Stroke Res. 2012. Aug 14. PMID: 24323830

Guzzo C, **Ayer A**, Basta S, Banfield BW, Gee K. *IL-27 Enhances LPS-Induced Proinflammatory Cytokine Production via Upregulation of TLR4 Expression and Signaling in Human Monocytes*. J. Immunol. 2012 Jan 15, 188;864-73. PMID: 22156348

**Ayer A**, Velez R, Sliesoraitis S. *Necrobiotic Cavitory Pulmonary Nodules: A Case Report*. J. Pulmon. Resp. Med. 2012, 2(4);1-2.

Hwang BY, Appelboom G, **Ayer A**, Kellner CP, Kotchetkov IS, Gigante PR, Haque R, Kellner M, Connolly ES. *Advances in neuroprotective strategies: potential therapies for intracerebral hemorrhage*. Cerebrovasc Dis. 2011;31(3):211-22. PMID: 21178344

**Ayer A**, Campbell A, Appelboom G, Hwang BY, McDowell M, Piazza M, Feldstein NA, Anderson RC. *The sociopolitical history and physiological underpinnings of skull deformation*. Neurosurg Focus. 2010 Dec;29(6):E1. PMID: 21121715

#### Book Chapters:

**Ayer A**, Arnaout O, Reddy CD, Ganju A. *Peripheral Nerve Grafting and Harvesting Techniques*. *Atlas of Neurosurgical Techniques; Spine and Peripheral Nerves*. Fessler RG, Sekhar LN. Chapter 146; pp 928-931. Thieme. 2016.

#### Poster Presentations:

Suresh AK, **Ayer A**, Rosenow JM, Miller LE, Bensmaia S. *Sensory Computations in the Cuneate Nucleus of Macaques*. Oral Presentation. Nanosymposium. Society for Neuroscience. October 2019. Chicago, IL.

**Ayer A**, Krishnan SR, Kaur G, Murthy NK, Ordon M, Karras CL, Abecassis ZA, Rosenow JM, Tate MC, Alden TD, Potts MB, Rogers JA. *Wireless, noninvasive thermal sensors for the continuous monitoring of ventricular shunt function in pediatric and adult patients*. Congress of Neurological Surgeons. October 2019. San Francisco, CA.

Rosenow JM, Versteeg CS, Suresh AK, **Ayer A**, Miller LE, Bensmaia SJ. *Chronic single- neuron recordings from the cuneate nucleus: surgical methodology*. Congress of Neurological Surgeons. October 2018. Houston, TX.

Abecassis ZA, **Ayer A**, Templer JW, Tate MC. *Risk factors and consequences of intraoperative seizures associated with direct cortical stimulation during awake craniotomy*. Congress of Neurological Surgeons. October 2018. Houston, TX.

**Ayer A**, Krishnan S, Ray T, Abecassis ZA, Murthy N, Potts MB, Rogers JA. *Thermal biosensors in the assessment of ventricular shunt failure*. American Association of Neurological Surgeons. April 2018. New Orleans, LA.

Krishnan S, Ray T, Mickle M, **Ayer A**, Gutruf P, Gereau R, Rogers JA. *Soft, Bio- Integrated Thermal Electronics for Neuroscience and Neurosurgery*. Materials Research Society. April 2018. Phoenix, AZ.

**Ayer A**, Abecassis ZA, Nanney T. *The argument for anterior cervical discectomy and fusion*. Current Techniques in the Treatment of Cranial and Spinal Disorders. October 2016. Broomfield, CO.

Abecassis Z, **Ayer A**, Templer J, Tate MC. *Intraoperative Seizure Risk Factors Associated with Direct Cortical Stimulation: A Single Center Study*. Feinberg School of Medicine AOSC. November 2016. Chicago, IL.

Smith TR, Nanney AD, **Ayer A**, Cybulski GR. *The Meaningful Use of Health Information Technology to Increase Value of Neurosurgical Care*. Neurosurgical Society of America. 2014. St. Andrews, NB.

Ortega-Gutierrez S, Amaro-Delgado S, Szeder V, Linares G, Vibbert M, Lay C, Choi A, Ko S-B, **Ayer A**, Gilmore E, Kellner S, Claassen J, Lee K, Mayer S, Schmidt M, Badjatia N. Tracheostomy after subarachnoid hemorrhage; predictors at admission and associated risk factors. Neurocritical Care Society 8th Annual Meeting. September 2010. San Francisco, CA.

Guzzo C, **Ayer A**, Che Mat NF, Gee K. Interleukin-27 induced TLR-4 expression is mediated by JAK/STAT signaling and NF- $\kappa$ B activation in human monocytes. Canadian Society for Immunology, April 2010. Niagara Falls, ON, Canada.

Guzzo C, **Ayer A**, Che Mat NF, Gee K. Interleukin-27 induces TLR-4 Expression in Human Monocytes via JAK/STAT and NF- $\kappa$ B Signaling Pathways. Canadian Health Science Research Forum; Infectious Disease and Global Health. June 2-4, 2010. Winnipeg, MB., Canada.

#### **D. Additional Information: Research Support and/or Scholastic Performance**

*Cisco Global Problem Solver Prize*

Rhaeos, The Wearable Shunt Monitor

Amit Ayer

\$100,000 research award (awarded 7/2019)

*Stanley Manne Children's Research Institute Visionary Award*

Non-Invasive Wireless Thermal Sensors in the Diagnosis of Ventricular Shunt Malfunction in Pediatric Hydrocephalic Patients

Principal Investigator: Tord Alden, MD

Stanley Manne Children's Research Institute

\$75,000 research award (awarded 12/2018)

*Pediatric Hydrocephalus Foundation Research Grant*

Evaluating the Use of Wireless, Thermal Sensors in the Detection of Ventricular Shunt Function

Principal Investigator: Amit Ayer, MD

Pediatric Hydrocephalus Foundation

\$10,000 research award (awarded 12/2018)

*Dixon Translational Sciences Innovation and Young Investigator Award*

Evaluating the use of epidermal thermal biosensors in the assessment of ventricular shunt function

Principal Investigator: Matthew Potts, MD

Northwestern University Clinical and Translational Science Institute

\$35,000 research award (awarded 11/2017)