

Seun Johnson-Akeju, M.D., M.M.Sc., Recipient of the 2019 James E. Cottrell, M.D., Presidential Scholar Award

Jeanine P. Wiener-Kronish, M.D.



Fig. 1. Seun Johnson-Akeju, M.D., M.M.Sc., recipient of the 2019 James E. Cottrell, M.D., American Society of Anesthesiologists Presidential Scholar Award.

The 2019 recipient of the James E. Cottrell, M.D., Presidential Scholar Award is Seun Johnson-Akeju, M.D., M.M.Sc., Director of Neurosurgical Anesthesia at Massachusetts General Hospital, The Massachusetts General Hospital Endowed Scholar in Anesthesia and Clinical Research, and Associate Professor of Anaesthesia at Harvard Medical School (Boston, Massachusetts). I have come to know Dr. Johnson-Akeju very well since I became the Anesthetist-in-Chief at Massachusetts General Hospital. I remain impressed by his unwavering commitment and dedication to research, and his clinical and scholarly

accomplishments. His selfless acts of generosity and commitment to mentorship and diversity are equally impressive. Our faculty recently honored him with the Mentorship Award for Academic Excellence given in recognition for his dedication to fostering the success of faculty colleagues.

Dr. Johnson-Akeju received a Bachelor of Science degree, with honors, from the New Jersey Institute of Technology (Newark, New Jersey) and a Doctor of Medicine degree from Rutgers – The New Jersey Medical School (Newark, New Jersey). He sought opportunities to further his scientific learning in medical school by conducting research as a first-year medical student under the mentorship of Lin Yan, Ph.D., in a cardiovascular research laboratory (Newark, New Jersey). This experience solidified his passion for research and prompted him to commit a year between his third and fourth years of medical school to conducting basic science research by participating in the Howard Hughes Medical Institute–National Institutes of Health Research Scholars Program. As a Research Scholar, he conducted research under the mentorship of John Park, M.D., Ph.D., then Chief of the Surgical and Molecular Neuro-oncology at the National Institute of Neurological Disorders and Stroke (Bethesda, Maryland). Undoubtedly, the scientific environment and experience provided by the Howard Hughes Medical Institute and the National Institutes of Health were fundamental to his decision to become a physician–scientist.

He balanced his academic commitments and research interests in college and medical school with a variety of other interests. In 1999, during his sophomore year in college, he enlisted as a private in a combat arms unit of the New Jersey Army National Guard and completed armor crew member training (Fort Knox, Kentucky). He eventually rose through the ranks to become a sergeant. His leadership potential was recognized early on as he was selected to attend Officer Candidate School (Fort Sam Houston, Texas). He resigned his commission to pursue residency training.

We were glad to recruit Dr. Johnson-Akeju to Harvard Medical School and Massachusetts General Hospital to complete his internship and residency training program in anesthesiology. Upon completion of residency training in 2010, he was appointed to our clinical faculty and the Harvard Basic Science Training for Anesthetists T32 grant. His research objective has always been to establish a cutting-edge clinical neuroscience research program using

Submitted for publication June 18, 2019. Accepted for publication June 24, 2019. From the Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, Boston, Massachusetts.

Copyright © 2019, the American Society of Anesthesiologists, Inc. All Rights Reserved. *Anesthesiology* 2019; 131:792–4. DOI: 10.1097/ALN.0000000000002902

anesthesia as a tool for studying the systems-level mechanisms of fundamental neurobiological processes. As a T32 trainee, he was mentored in basic science methods by Kevin Eggan, Ph.D., a McArthur “Genius Grant” Fellowship recipient and Professor of Stem Cell and Regenerative Biology at Harvard University (Cambridge, Massachusetts). He also obtained formal training in clinical research methods by completing the Master’s in Medical Science degree in Clinical Investigation at Harvard Medical School. He returned to the department to establish his independent research program under the mentorship and guidance of Emery N. Brown, M.D., Ph.D., a renowned anesthesiologist and statistician, and Patrick Purdon, Ph.D., an innovative bioengineer and neuroscientist, both of the Neuroscience Statistics Research Laboratory at Massachusetts General Hospital. His research training is unique as it encompasses basic science, systems neuroscience including signal processing, and formal training in clinical research methods.

Dr. Johnson-Akeju received his initial grant support from the Massachusetts General Hospital Executive Committee on Research and Center for Diversity and Inclusion to pursue studies of dexmedetomidine-induced biomimetic sleep. This was shortly followed by a Mentored Research Training Grant from the Foundation of Anesthesia Education and Research (Schaumburg, Illinois) to use integrated positron emission tomography and magnetic resonance imaging technology to study dexmedetomidine-induced altered arousal states in healthy volunteers. He directs the Neuroanesthesia Research Laboratory (Massachusetts General Hospital, Boston, Massachusetts) and is the principal investigator of an R01 grant from the National Institute of Aging (Bethesda, Maryland) to investigate pathophysiological mechanisms of delirium and the putative benefits of biomimetic sleep as a treatment strategy.¹ As an independent investigator, he seeks to further our understanding of neurophysiological mechanisms that explain general anesthesia-induced brain states, sleep, and anesthesia-associated neurocognitive dysfunction.² Importantly, his research is collaborative and cross-disciplinary as evident by published works in specialty and nonspecialty journals such as *ANESTHESIOLOGY*, *Brain*, *Behavior*, and *Immunity*, *British Journal of Anaesthesiology*, *Clinical Neurophysiology*, *Current Opinion Neurobiology*, *eLife*, *Journal of Neuroscience*, *Molecular Psychiatry*, *Neuroimage Clinical*, *Neurobiology of Aging*, and *Neurology*. He is a co-investigator on three R01 grants from the National Institute of Neurological Disorders and Stroke (Bethesda, Maryland), an R01 grant from the National Institute of Aging (Bethesda, Maryland), and a National Institutes of Health P01 grant from the National Institute of General Medical Science (Bethesda, Maryland).

Dr. Johnson-Akeju began developing his independent research program by using a systems neuroscience research approach to study the neurophysiology of general anesthesia in humans. In 2012, he performed the first positron emission tomography and magnetic resonance imaging study of an anesthetic drug.^{3–5} He also conducted several highly

informative retrospective investigations of electroencephalogram dynamics across different anesthetic agents and different age groups using a database of clinical cases collected in Massachusetts General Hospital operating rooms.^{6–13} These studies have helped relate anesthetic-induced oscillations to putative neural circuit mechanisms and are helping to inform real-time anesthetic brain state monitoring. He has designed and conducted numerous studies in healthy volunteers, many of which are yet to be published.^{14–16} He has since established an interdisciplinary clinical neuroscience research program with the specific goal of using anesthesia as a principled neuroscience probe to study the systems-level mechanisms of fundamental neurobiological processes.

As a testament to his commitment towards personal and professional growth, he was selected for a translational research training course recently launched by the Massachusetts General Hospital Research Institute called Bridging Academia and Industry. This course, which complements didactics with a project competition, was designed to support translationally minded scientists by fostering collaborations between academia and industry. Not surprisingly, I was at a recent Massachusetts General Hospital Chiefs meeting where it was announced that Dr. Johnson-Akeju, alongside Dr. David Binder, M.D., M.B.A., from the Department of Physical Medicine and Rehabilitation, were awarded a grant to perform relevant experiments and develop a go-to-market plan for their winning project—a blend of their existing research and clinical programs. The translational appeal and clinical potential of their project was held in high regard. This news is particularly exciting as it is in line with our departmental history and culture of fostering innovation in medicine such as the development of short-acting muscle relaxants (Richard Kitz, M.D.), smart monitors and pumps (Nathaniel Sims, M.D.), nitric oxide for pulmonary hypertension (Warren Zapol, M.D., and Claes Frostell, M.D., Ph.D.), among many others.

In addition to his research activities, Dr. Johnson-Akeju has gained national recognition as a leader in healthcare. He was recently invited to attend the National Academy of Medicine Emerging Leaders Forum (Washington, DC), an annual assembly of outstanding professionals with exceptional promise, achievement, and leadership. At the institutional level, he is a member of both the McCance Center for Brain Health at Massachusetts General Hospital, the Massachusetts General Hospital Neuroscience Institute, and numerous committees including those related to grant review, and equity. Departmentally, he is a valuable asset to our clinical and research communities and is sought after to advise on educational and research initiatives. He holds several key leadership positions that have resulted in numerous initiatives to improve patient safety and outcomes, created a collaborative and collegial work environment, and helped guide the professional development of numerous research and clinical trainees. As the Director of Neurosurgical Anesthesia at Massachusetts General Hospital, he has been vital to the

recruitment and retention of highly skilled anesthesiologists to a very busy clinical service, and for the implementation of state and national safety guidelines in intraoperative magnetic resonance imaging operating rooms. These efforts have markedly decreased safety concerns and events. He is the Director of our newly established Departmental Center for Clinical Research. He is now the Fellowship Director of our Harvard Combined Neurosurgical Anesthesia training program and a mentor to numerous residents, medical school students, and undergraduate research trainees.

I am fortunate that Dr. Johnson-Akeju is a member of our faculty. He is held in high esteem by our staff as a skillful clinician, scientist, mentor, and administrator. It gives me immense pleasure to know that our clinical specialty will benefit from his persistent and consistent pursuit of excellence.

Competing Interests

The author declares no competing interests.

Correspondence

Address correspondence to Dr. Wiener-Kronish: Department of Anesthesia, Critical Care and Pain Medicine, Massachusetts General Hospital, 55 Fruit Street, GRB - 4th Floor, Suite 444, Boston, Massachusetts 02114. JWIENER-KRONISH@mgh.harvard.edu. This article may be accessed for personal use at no charge through the Journal Web site, www.anesthesiology.org.

References

- Shelton KT, Qu J, Bilotta F, Brown EN, Cudemus G, D'Alessandro DA, Deng H, DiBiasio A, Gitlin JA, Hahn EY, Hobbs LE, Houle TT, Ibalá R, Loggia ML, Pavone KJ, Shaefi S, Tolis G, Westover MB, Akeju O: Minimizing ICU Neurological Dysfunction with Dexmedetomidine-induced Sleep (MINDDS): Protocol for a randomised, double-blind, parallel-arm, placebo-controlled trial. *BMJ Open* 2018; 8: e020316
- Akeju O, Brown EN: Neural oscillations demonstrate that general anesthesia and sedative states are neurophysiologically distinct from sleep. *Curr Opin Neurobiol* 2017; 44:178–85
- Akeju O, Loggia ML, Catana C, Pavone KJ, Vazquez R, Rhee J, Contreras Ramirez V, Chonde DB, Izquierdo-Garcia D, Arabasz G, Hsu S, Habeeb K, Hooker JM, Napadow V, Brown EN, Purdon PL: Disruption of thalamic functional connectivity is a neural correlate of dexmedetomidine-induced unconsciousness. *Elife* 2014; 3:e04499
- Song AH, Kucyi A, Napadow V, Brown EN, Loggia ML, Akeju O: Pharmacological modulation of noradrenergic arousal circuitry disrupts functional connectivity of the locus ceruleus in humans. *J Neurosci* 2017; 37:6938–45
- Hashmi JA, Loggia ML, Khan S, Gao L, Kim J, Napadow V, Brown EN, Akeju O: Dexmedetomidine disrupts the local and global efficiencies of large-scale brain networks. *ANESTHESIOLOGY* 2017; 126:419–30
- Akeju O, Hamilos AE, Song AH, Pavone KJ, Purdon PL, Brown EN: GABAA circuit mechanisms are associated with ether anesthesia-induced unconsciousness. *Clin Neurophysiol* 2016; 127:2472–81
- Akeju O, Pavone KJ, Thum JA, Firth PG, Westover MB, Puglia M, Shank ES, Brown EN, Purdon PL: Age-dependency of sevoflurane-induced electroencephalogram dynamics in children. *Br J Anaesth* 2015; 115 Suppl 1:i66–76
- Akeju O, Pavone KJ, Westover MB, Vazquez R, Prerau MJ, Harrell PG, Hartnack KE, Rhee J, Sampson AL, Habeeb K, Gao L, Lei G, Pierce ET, Walsh JL, Brown EN, Purdon PL: A comparison of propofol- and dexmedetomidine-induced electroencephalogram dynamics using spectral and coherence analysis. *ANESTHESIOLOGY* 2014; 121:978–89
- Akeju O, Song AH, Hamilos AE, Pavone KJ, Flores FJ, Brown EN, Purdon PL: Electroencephalogram signatures of ketamine anesthesia-induced unconsciousness. *Clin Neurophysiol* 2016; 127:2414–22
- Akeju O, Westover MB, Pavone KJ, Sampson AL, Hartnack KE, Brown EN, Purdon PL: Effects of sevoflurane and propofol on frontal electroencephalogram power and coherence. *ANESTHESIOLOGY* 2014; 121:990–8
- Lee JM, Akeju O, Terzakis K, Pavone KJ, Deng H, Houle TT, Firth PG, Shank ES, Brown EN, Purdon PL: A Prospective study of age-dependent changes in propofol-induced electroencephalogram oscillations in children. *ANESTHESIOLOGY* 2017; 127:293–306
- Purdon PL, Pavone KJ, Akeju O, Smith AC, Sampson AL, Lee J, Zhou DW, Solt K, Brown EN: The ageing brain: Age-dependent changes in the electroencephalogram during propofol and sevoflurane general anaesthesia. *Br J Anaesth* 2015; 115 Suppl 1:i46–57
- Pavone KJ, Akeju O, Sampson AL, Ling K, Purdon PL, Brown EN: Nitrous oxide-induced slow and delta oscillations. *Clin Neurophysiol* 2016; 127:556–64
- Akeju O, Kim SE, Vazquez R, Rhee J, Pavone KJ, Hobbs LE, Purdon PL, Brown EN: Spatiotemporal dynamics of dexmedetomidine-induced electroencephalogram oscillations. *PLoS One* 2016; 11:e0163431
- Pavone KJ, Su L, Gao L, Eromo E, Vazquez R, Rhee J, Hobbs LE, Ibalá R, Demircioglu G, Purdon PL, Brown EN, Akeju O: Lack of responsiveness during the onset and offset of sevoflurane anesthesia is associated with decreased awake-alpha oscillation power. *Front Syst Neurosci* 2017; 11:38
- Akeju O, Hobbs LE, Gao L, Burns SM, Pavone KJ, Plummer GS, Walsh EC, Houle TT, Kim SE, Bianchi MT, Ellenbogen JM, Brown EN: Dexmedetomidine promotes biomimetic non-rapid eye movement stage 3 sleep in humans: A pilot study. *Clin Neurophysiol* 2018; 129:69–78