## Statistical Analysis Helps Explain Mysterious Mechanisms Involved in the State of General Anesthesia

*EMBARGOED: NOT FOR PUBLIC RELEASE BEFORE 2:00 P.M. ON MONDAY, JULY 31*

ALEXANDRIA, Va. (July 31, 2017) – Although the mechanisms by which anesthetic drugs induce the state of general anesthesia have been considered one of the biggest mysteries of modern medicine and science, new research is deciphering this unknown. Emery Brown, the Edward Hood Taplin Professor of Medical Engineering and of Computational Neuroscience at the Massachusetts Institute of Technology (MIT) and the Warren M. Zapol Professor of Anaesthesia at Harvard Medical School and Massachusetts General Hospital, will present new insight involved in conducting and analyzing experiments in this field July 31 at the 2017 Joint Statistical Meetings (JSM).

Brown's research shows how application of signal processing algorithms can be used to define such mechanisms. "Careful signal processing combined with experimentation has allowed us to show that a primary mechanism through which anesthetics work is by creating oscillations that disrupt how communications among different regions of the brain occur," said Brown, who is both a statistician and a practicing anesthesiologist.

Additionally, these algorithms enable principled use of the electroencephalogram (EEG) to monitor brain states of patients under anesthesia, define highly reliable EEG signatures for different anesthetic drug classes and establish how brain responses to anesthetic drugs change in a highly systematic and predictable way with patient age.

"Beyond suggesting a mechanism of anesthetic action, this discovery is of great clinical importance because it suggests that brain states under general anesthesia can be monitored using the EEG on patients in operating rooms," said Brown. "It also explains why remaining in the state of sustained, unnatural, drug-induced oscillations makes brain dysfunction after general anesthesia so prevalent—particularly in elderly patients," he continued. A common observation in the medical profession is that older patients' brains do not function as well after anesthesia.

Brown's presentation addresses the following three problems in basic and clinical neuroscience research:

- Characterizing the dynamics of the brain response to anesthetics
- Real-time tracking of brain states of patients receiving general anesthesia
- Real-time assessment and control of medical coma

As part of his research on mechanisms of general anesthesia, Brown is conducting a phase II clinical trial using Ritalin—the drug commonly used to treat Attention Deficit Hyperactivity Disorder (ADHD)—to rapidly induce emergence from general anesthesia. This use of Ritalin holds the promise of providing a way to turn the brain back on after general anesthesia and thereby help reduce the cognitive dysfunction commonly seen in elderly patients following general anesthesia.

Media can attend JSM for FREE, but must pre-register by emailing Jill Talley, ASA public relations manager, at jill@amstat.org.


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### *About JSM 2017*
JSM 2017 is the largest gathering of statisticians and data scientists in the world, taking place July 29-August 3, 2017, in Baltimore. Occurring annually since 1974, JSM is a joint effort of the American Statistical Association, International Biometric Society (ENAR and WNAR), Institute of Mathematical Statistics, Statistical Society of Canada, International Chinese Statistical Association, International Indian Statistical Association, Korean International Statistical Society, International Society for Bayesian Analysis, Royal Statistical Society, and International Statistical Institute. JSM activities include oral presentations, panel sessions, poster presentations, professional development courses, an exhibit hall, a career service, society and section business meetings, committee meetings, social activities and networking opportunities.


### *About the American Statistical Association*
The ASA is the world's largest community of statisticians and the oldest continuously operating professional science society in the United States. Its members serve in industry, government and academia in more than 90 countries, advancing research and promoting sound statistical practice to inform public policy and improve human welfare. For additional information, please visit the ASA website at www.amstat.org.


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