Emery N. Brown, M.D., Ph.D.
Department of Anesthesia, Critical Care and Pain Medicine
Massachusetts General Hospital
Harvard Medical School

Department of Brain and Cognitive Sciences
Harvard-MIT Division of Health-Sciences and Technology
Massachusetts Institute of Technology

Abstract

Characterizing General Anesthesia-Induced Loss of Consciousness

General anesthesia is a drug-induced, reversible condition comprised of five behavioral states: unconsciousness, amnesia (loss of memory), analgesia (loss of pain sensation), akinesia (immobility), and hemodynamic stability with control of the stress response. The mechanisms by which anesthetic drugs induce the state of general anesthesia are considered one of the biggest mysteries of modern medicine. We have been using three experimental paradigms to study general anesthesia-induced loss of consciousness in humans: combined fMRI/EEG recordings, high-density EEG recordings and intracranial recordings. These studies are allowing us to establish precise neurophysiological, neuroanatomical and behavioral correlates of unconsciousness under general anesthesia. We will discuss the relation between our findings and two other important altered states of arousal: sleep and coma. Our findings suggest that the state of general anesthesia is not as mysterious as currently believed.