Abstract

Adult humans have the ability to regulate their emotions and exert self-control of their behavior. This ability emerges late in development and breaks down in some psychiatric diseases. A leading model of this regulation hypothesizes top-down interactions between frontal parts of brain which are involved in modulating behavior. However, the neural basis of this regulation has never been investigated in humans at the level of individual brain cells. This research provides the first extensive study of what happens to the activity of individual neurons in the human brain as people experience and regulate emotions, or when people try to suppress thoughts and alter future choices. The research examines systematic patterns in the activity of individual brain cells which are associated with such regulation. Neuronal activity was monitored with implanted electrodes in patients undergoing brain surgery. During monitoring, participants viewed content and were regulating their feelings or thoughts based in response to the content (public service, political advertisements, negative messages, etc.). Participants were instructed to either naturally view the content or to regulate their emotions and thoughts. We find evidence that such regulation is reflected by systematic patterns in single neuron activity.