

# SCIENTIFIC AMERICAN

[Scientific American Mind](#) - April 27, 2010

## **Going Out with a Bang** **The brain surges with activity just before death**

By Peter Sergo

People who are resuscitated from near death often report strange sensory phenomena, such as memories “flashing before their eyes.” Now a rare assessment of brain activity just before death offers clues about why such experiences occur.

Anesthesiologist Lakhmir Chawla of George Washington University Medical Center and his colleagues recently published a retrospective analysis of brain activity in seven sedated, critically ill patients as they were removed from life support. Using EEG recordings of neural electrical activity, Chawla found a brief but significant spike at or near the time of death—despite a preceding loss of blood pressure and associated drop in brain activity.

“To our knowledge, this is the first time that this event has been shown to occur,” Chawla explains. “It occurs at a very peculiar time point, when most people would think your brain would physiologically die [because of] an absence of blood flow.”

The jolts lasted 30 to 180 seconds and displayed properties that are normally associated with consciousness, such as extremely fast electrical oscillations known as gamma waves. Soon after the activity abated, the patients were pronounced dead.

Chawla posits that the predeath spikes are most likely brief, “last hurrah” seizures originating in brain areas that were irritable from oxygen starvation. Living nerve cells constantly maintain an electrical charge gradient, similar to the difference in charge on the poles of a battery. Keeping up this polarity takes energy—in this case, energy created from oxygen. As blood flow slows and oxygen runs out, the cells can no longer maintain polarity and they fire, causing a cascade of activity that ripples through the brain. If these seizures were to occur in memory regions, they could explain the vivid recollections often reported by people who are resuscitated from near death, Chawla says.

Further speculation is difficult because in these patients only the forebrain was monitored, notes Chawla, adding that the end of life is a poorly researched area. Next he and his colleagues would like to use more sophisticated imaging on a larger patient population to assess the entire brain in greater detail during near-death episodes.

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