

Family voices and stories speed coma recovery

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Theresa Pape is a neuroscientist in physical medicine and rehabilitation at Northwestern University Feinberg School of Medicine and a neuroscientist at Hines VA Hospital. She is the lead author of a new study that shows that stories spoken by loved ones help awaken coma patients' unconscious brains and speed recovery. Credit: Jerry Daliege

"Can he hear me?" family members are desperate to know when a loved one with a traumatic brain injury is in a coma.

A new Northwestern Medicine and Hines VA Hospital study shows the voices of loved ones telling the patient familiar stories stored in his long-term memory can help awaken the unconscious brain and speed recovery from the [coma](#).

Coma patients who heard familiar stories repeated by [family](#) members four times a day for six weeks, via recordings played over headphones, recovered consciousness significantly faster and had an improved recovery compared to patients who did not hear the stories, reports the study.

The paper was published in the journal *Neurorehabilitation and Neural Repair* January 22.

"We believe hearing those stories in parents' and siblings' voices exercises the circuits in the brain responsible for long-term memories," said lead author Theresa Pape. "That stimulation helped trigger the first glimmer of awareness."

As a result, the [coma patients](#) can wake more easily, become more aware of their environment and start responding to conversations and directions.

"It's like coming out of anesthesia," Pape said. "It's the first step in recovering full consciousness."

Pape is a neuroscientist in physical medicine and rehabilitation at Northwestern University Feinberg School of Medicine and a neuroscientist at Hines VA.

"After the study treatment, I could tap them on the shoulder, and they would look at me," Pape said. "Before the treatment they wouldn't do that."

Being more aware of their environment means the patients can actively participate in physical, speech and occupational therapy, all essential for their rehabilitation.

A coma is an unconscious condition in which the patient can't open his eyes. Patients usually progress from a coma to either a minimally conscious or vegetative state, and these states can last a few weeks, months or years. Every five seconds, someone in the U.S. has a [traumatic brain injury](#). Troops deployed to wars zones are at an even greater risk for having a severe enough brain injury to cause a coma.

"It's an incredibly common and devastating injury," Pape said.

The familiar voices treatment also benefits families.

"Families feel helpless and out of control when a loved one is in a coma," Pape said. "It's a terrible feeling for them. This gives them a sense of control over the patient's recovery and the chance to be part of the treatment."

Such was the case for Corinth Catanus, whose husband, Godfrey, a former California youth minister, was a participant in the study after being in a coma for three months. "The stories I told him helped Godfrey recover from his coma, and they helped me feel I could do something for him," she said. "That gave me hope." (More on Godfrey and Corinth's story below.)

The Brain Lit Up in Response to Family Voices

When patients like Godfrey Catanus in the study heard the voice of a family member calling their names out loud and reciting stories while they were in an MRI, their brains showed increased neural activity. This was indicated by bright yellow and red blobs of light in regions involved with understanding language and long-term memory.

"We saw changes in the blood oxygen level in their brain regions associated with retrieving [long-term memory](#) and understanding language," Pape said. "That means they were using those regions of their brains."

How the Study Worked

The randomized, placebo-controlled study, Familiar Auditory Sensory Training (FAST), enrolled 15 patients with traumatic closed head injuries who were in a vegetative or [minimally conscious state](#). They were an average age of 35 (12 men and three women) with injuries caused by motorcycle or car accidents, bomb traumas or assaults. The FAST treatment began an average of 70 days after the injury.

Pape and colleagues first did baseline testing to see how responsive patients were to sensory information such as bells or whistles, if they followed directions to open their eyes and if they were alert enough to visually track someone walking across the room. Their responses provided a benchmark to see if they changed or improved after six weeks of treatment. (A person in a minimally conscious state can occasionally follow directions.)

Scientists also had the patients listen to familiar and non-familiar voices tell different stories to get a baseline MRI of how the blood oxygen levels in their brains changed while listening.

Collecting Family Stories to Tell

The next step was having families work with therapists to identify and construct the important stories about events that the patient and family participated in together.

"It could be a family wedding or a special road trip together such as going to visit colleges," Pape said. "It had to be something they'd remember, and we needed to bring the stories to life with sensations, temperature and movement. Families would describe the air rushing past the patient as he rode in the Corvette with the top down or the cold air on his face as he skied down a mountain slope."

Families brought in an armful of photo albums to come up with topics for the stories. Then parents and siblings recorded at least eight stories, which they practiced reciting naturally and using the patient's nickname.

After six weeks of listening to the recorded stories, Pape repeated the earlier baseline tests in an MRI. In one, patients listened to familiar and unfamiliar voices telling the same story they heard at baseline (a short joke about a man buying ice-cream and getting a pickle with it.)

The MRI image showed a change in the oxygen level, indicating greater responsiveness to the unfamiliar voice telling a story. The oxygen level did not change for the familiar voice, which remained the same as baseline.

"This indicates the patient's ability to process and understand what they're hearing is much better," Pape said. "At baseline they didn't pay attention to that non-familiar voice. But now they are processing what that person is saying."

In another test, patients listened to a small bell ringing as before. But this

time, patients' brains responded less to the bell, indicating they were better able to discriminate what's important to listen to.

"Mom's voice telling them familiar stories over and over helped their brains pay attention to important information rather than the bell," Pape said. "They were able to filter out what was relevant and what wasn't."

The biggest gains in recovery came in the first two weeks of the treatment, with small incremental gains over the next four weeks.

Pape is currently analyzing her data to determine if the FAST intervention strengthened the brain's wiring, the elongated fibers called axons that transmit signals between neurons.

Recording and playing the stories is something all families can do when a loved one is in a coma. It is logical that people in a coma as a result of a stroke would also respond favorably to the treatment, Pape said.

"This gives families hope and something they can control," Pape said. She recommends families work with a therapist to help them construct the stories. The recorded stories can augment the other therapies a patient is undergoing.

Why Pape Launched the Study

Pape was inspired to launch the study based on families' feedback while she worked as a speech therapist for coma patients with traumatic brain injuries. Families often told her the patient responded better to them than to a stranger. Pape began to observe the patients with families and saw they were right.

Pape speculated that if therapists could stimulate and exercise people's brains when they are unconscious, it would help them recover. She

developed the protocol to see if it worked. The study was funded by V.A.'s Rehabilitation, Research and Development Service.

Patient Godfrey Catanus Emerges from Coma

Corinth Catanus's voice, recorded on a CD, playfully reminded her husband, Godfrey, of the morning she craved chicken nuggets during her second pregnancy.

"Remember the morning I had a craving for chicken nuggets, and no fast food restaurant sold it that early in the morning?" she asked. He drove to several fast-food locations across town before work to find them, she recalled, only to discover they were the wrong kind when he arrived home. That night he renewed his quest until he snagged the exact ones she coveted.

Family stories like these—recorded by Corinth and Godfrey's brothers—were played through headphones for Godfrey four times a day while he lay in a three-month coma. He was part of a Northwestern Medicine and Hines V.A. clinical trial that studied whether repeated stimulation with familiar voices could help repair a coma victim's injured brain networks and spur his recovery.

Those recordings helped awaken Godfrey from his vegetative state and pull him back to consciousness, based on the new study findings.

Godfrey recalls hearing Corinth's voice and his brother's voice on the recordings during that time.

"It was comforting to think that they were 'there' with me," Godfrey wrote in an email. "It helped me by giving my brain something to connect with."

In 2010, Godfrey, then a 32-year-old youth minister in Irvine, California, suffered a brain injury and went into a coma. Corinth, a neonatal intensive care nurse, was pregnant with their second child at the time.

The couple grew up in the Chicago suburbs, and Corinth wanted Godfrey to be treated at the Rehabilitation Institute of Chicago. Their church raised funds to hire an air ambulance to transport the comatose Godfrey to the Chicago hospital. While there, the family learned about the familiar voices study and wanted to participate.

After several weeks of listening to the tapes, Godfrey, who was severely disabled by his injury and unable to speak easily, slowly began to respond by gesture to questions asked by his therapist. But his responses were inconsistent. Then Corinth asked him something she knew could get a rise out of the devoted Chicago basketball fan.

"Will you ever be a Lakers' fan?" she asked mischievously. Godfrey stared hard at the "no" card. "Will you always be a Chicago Bulls' fan?" His gaze shifted unequivocally to "yes".

"That was the turning point," Corinth said. "I realized he was becoming more aware and more conscious," Corinth said.

Godfrey progressed and began typing out messages on an iPad. One of the first things he wrote, "I wish I could go to Disneyland." It was a favorite trip for the family.

Four years later, Godfrey now writes weekly devotionals that appear in his church's bulletin and website. And he is involved in his family's life. He reminds Corinth, via his iPad, about the family's daily schedule like doctor's appointments for their daughters or his bus pick up to go to physical therapy. His daughters like to hang out with him on his

wheelchair.

"The voices treatment made a huge difference in his recovery," Corinth said. "I know it helped bring him back to us."

Provided by Northwestern University

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