Scientists Identify Brain Areas Altered During Hypnosis

Fran Lowry | August 02, 2016

Distinct areas of the brain show altered activity and connectivity during hypnotic trances in individuals who are highly hypnotizable, researchers have discovered.

These changes in neural activity underlie the focused attention, enhanced somatic and emotional control, and lack of self-consciousness that characterize the hypnotic state, the researchers, led by David Spiegel, MD, professor and associate chair of psychiatry and behavioral sciences at Stanford University School of Medicine, Palo Alto, California, note.

"They can help us understand why it is that hypnosis enables some of us to do things we might not ordinarily be able to do," Dr Spiegel told *Medscape Medical News*.

"Hypnosis is the oldest Western form of psychotherapy, but it's been tarred with the brush of dangling watches and purple capes. In fact, it's a very powerful means of changing the way we use our minds to control perception and our bodies," Dr Spiegel said.

"If hypnosis is a kind of brain activity that has some special potential to help us deal with problems like pain and anxiety and stress, I think this study provides us with evidence that, indeed, there is," he said.

The study was published online July 28 in *Cerebral Cortex*.

Reduced Self-consciousness

To elucidate changes in the brain during the hypnotic state, the investigators used functional MRI to examine activity and functional connectivity among three networks in hypnosis: the default mode network, the executive control network, and the salience network.

After screening 545 healthy individuals, the researchers selected 36 people who scored high on tests of hypnotizability, and 21 people who scored on the extreme low end of the hypnotizability scales.

Each person was scanned while resting, while recalling a memory, and during two different hypnosis sessions.

"About 10% of the overall population are highly hypnotizable, but about two thirds of the overall population are somewhat hypnotizable, and a third are not at all. In this study, to be able to get the best shot at demonstrating brain differences, we chose the extremes and took the bottom and top 10%, but there are lot of people in the middle who can use hypnosis, because most people are at least somewhat hypnotizable," Dr Spiegel explained.

The imaging results showed changes in three areas of the brain, but only in the highly hypnotizable group and only while the participants in this group were undergoing hypnosis.

During hypnosis, there was reduced activity in the dorsal anterior cingulate, part of the brain's salience network, an increase in the connectivity between the dorsolateral prefrontal cortex and the insula, and reduced connectivity between the dorsolateral prefrontal cortex and the default mode network, which includes the medial prefrontal and the posterior cingulate cortex.

"The dorsal anterior cingulate cortex is a context generator. It helps us decide what is going on in different places and which ones we need to pay more attention to, so if you're worried about competing activities, you look at the context and decide which is more important," Dr Spiegel explained.

"When we turn that region down, you're not worrying about the other things you're not doing, and so you get more fully engaged in the task that you are involved with. You see that with hypnosis. It is an intensely focused kind of attention," he said.

"The second finding is the increase in the connectivity between the dorsolateral prefrontal cortex and the insula. Hypnosis is very good at regulating body states, so you can teach people how to picture something that they are worried about without having all the somatic sequelae, for instance, having the heart rate and blood pressure go up. You can just allow your body to float and feel

comfortable, even though you are thinking about what your boss said to you yesterday. This helps you handle things better because you are dissociating your physical reaction from the mental one," Dr Spiegel said.

"The third finding, the inverse relationship between the dorsal prefrontal cortex and the default mode, represents a disconnect between someone's actions and their awareness of their actions," he said.

"When you are really engaged in something, you don't really think about doing it, you just do it. In hypnosis, you reduce self-consciousness, so that's why a hypnotist can get a football coach dancing like a ballerina. He's not conscious about what he's doing, he's just doing it. Sometimes you want to be self-conscious, but other times you can do things better if you're not worried about how well you are doing them. I tell my patients, you can't write a play and write a review of the play at the same time. We are seeing that these elements of brain activity can help us understand why hypnosis helps us do things that we might not ordinarily be able to do," Dr Spiegel noted.

Alternative to Medication

Dr Spiegel's hope is that traditional medicine and psychology will start to take hypnosis more seriously as a viable treatment tool.

"Hypnosis is a new and different way of using your brain. For instance, the single, most pressing example at the moment is pain control. I saw a guy yesterday who has pain in his lower abdomen that has been troubling him for 3 years. He's on three or four pain meds, and he rated his pain as 3 out of 10 — not terrible, but it was there. After a few minutes of hypnosis, his pain was gone.

"We have millions of people addicted to opiates in this country and people dying from opiate addiction. It's time for us to teach people how to use these abilities they have to manage symptoms like pain and anxiety and deal with other problems.

"Most psychiatrists, general practitioners, and other health professionals can be trained to do hypnosis," Dr. Spiegel added.

"I would like to see it part of the standard curriculum of every medical school. The good medical schools tend to have it, but most medical schools don't. That's too bad. Hypnosis is a way of helping people, and it doesn't have to be done by physicians alone.

"Other healthcare personnel who, within their specialty area, like pain control and stress management, could use it as well. It's a tremendous opportunity that people have to learn to better manage themselves and their symptoms, and I would like to see it more widely used. This study is a way of saying, this hypnotism is an understandable neurobiological phenomenon that can be much better used to help people deal with all kinds of symptoms," he said.

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