

A New Paradigm For Psychedelics In Mental Health

Excerpt from a larger piece, "Psychedelics And The Opioid Crisis."

By Jack Firreno

The past decade has seen a resurgence of research into the potential for psychedelic substances such as LSD and psilocybin to treat addiction to treat mental illness. While researchers could observe the effects of these substances, they couldn't always explain them.

But that's changing now, thanks to advances in brain imaging technology.

In the 2016 peer-reviewed study "Psychedelics as Medicines," co-authors David Nichols, Charles Nichols, and Matthew Johnson argued that changes in the behavior of a person using psychedelics are merely the "observable markers" of an underlying mechanism.

And, using functional Magnetic Resonance Imaging, or fMRI, technology, the researchers formed a hypothesis for that mechanism that's consistent with existing data and test results.

If addiction and other mental illnesses "rewire" the brain, psychedelics can help to restore the brain to how it was wired before the disease took hold. The restoration process, their paper says, would work "In much the same way that a computer can be rebooted when its operation becomes sluggish."

"The idea that these substances are mind-expanding really is literally true if you think about the way the brain communicates," said David Nichols.

He's one of the study's authors and the Adjunct Professor at the UNC at Chapel Hill Eshelman School of Pharmacy and Distinguished Professor Emeritus at the Purdue University College of Pharmacy.

It's understood, Nichols said, that neurotransmitters signal each other from one area of the brain to the other. But, their precise pathways are mostly unknown.

Studies determine what areas of the brain are communicating by using a statistical analysis of brain activity. If one area generates a specific electrical pattern, and then

another does the same, the analysis identifies the correlation, and researchers recognize it as communication or connectivity.

What's new is that fMRIs revealed what researchers call "brain hubs." Each is a complex region that appears segregated, almost walled-off, from the other areas. There's a lot of communication and activity within each one, and then some connectivity and neuronal signaling to other regions.

This updated model casts neurotransmitters and pathways as merely components of a larger system rather than independent systems themselves.

Knowing this, researchers can think about fixing the machine as a whole rather than just replacing a part here and there. Psychedelics may hold the key to doing so.

Factors such as mental illness can disrupt the brain hubs, explained Nichols. They cause hubs to disconnect or stop working properly. They weaken in some places, become stronger in others, or talk to areas they're not supposed to talk to.

But psychedelics can affect connectivity in a different, potentially beneficial way.

The psychedelic substances induce strong, long-range connections across the brain, creating a web of global functional connectivity. They essentially knock down the walls of the hubs and allow the creation of many new connections across all the networks.

These new connections seem random, and Nichols imagines neurotransmitters are following paths of least resistance within the brain rather than any set tracks. Then, the increased functional connectivity fades away as the substance wears off.

With this information, he and others speculate that when psychedelics induce global connectivity, they also disrupt the unusual connections created by conditions such as addiction, anxiety, depression, and PTSD.

When the effects wear off, the brain can reforge connections. It starts from scratch without the forces that caused the previous hub connections. Using the substances in conjunction with psychotherapy would encourage the process.

For now, it's only a hypothesis, but it may not be just that for long. But if proven, said Nichols, it can represent a "new paradigm" in treating mental illness.

Nichols cites a study from the Imperial College of London that is nearly ready for publication. Correspondence with his colleagues revealed that the study demonstrates functional connectivity in people with those conditions returning to healthy patterns after psilocybin treatment.

"With functional connectivity, if we see [these results] with alcohol and nicotine, it will tell us these two brain areas are talking to each other in addicted brains, and they're not supposed to," he said.

"That will foster more work in psychiatry and pharmacology. It will give us new insights into these pathological conditions."

There's also an ongoing study at John Hopkins using psilocybin treatments on people with nicotine addiction, and another at New York University using psilocybin treatment on people with alcohol addiction.

"We anticipate that it will show disturbed patterns in addicted brains compared with control brains. Presumably addicted or depressed brains show disturbances — connectivities that don't exist in healthy brains," Nichols said. "After psilocybin, you'll see a loss in connections that are not supposed to be there."