

## Growing New Brain Cells

**Drugs that trigger the birth of neurons could provide the next generation of treatments for neurodegenerative disease, as well as depression.**

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By Emily Singer

Diseases such as Alzheimer's and Parkinson's are marked by the slow and debilitating death of certain types of nerve cells in the brain. But new studies suggest that drugs similar to those already used to treat Parkinson's and other disorders could actually spur growth of new neurons, improving symptoms in animal models. Scientists hope that finding compounds that can enhance the brain's natural ability to grow new cells will provide a more effective treatment for neurodegenerative diseases and depression.

While the adult brain was once thought to be a mostly static structure, scientists have discovered in recent years that some parts of the brain -- most notably, the hippocampus, an area involved in learning and memory, and the subventricular zone, which lines one of the brain's fluid-filled cavities -- continually produce neurons, especially after injury. "We know new cells are made and go to the site of new injury, whether it's stroke or Parkinson's or Alzheimer's," says David Greenberg, a neuroscientist at the [Buck Institute for Age Research](#) in Novato, CA. "One strategy to treat neurodegeneration is to boost this response."

Recent studies have shown that many types of drugs -- antidepressants, cholesterol-lowering drugs, even Viagra -- spur growth of new neurons in the brain, a process called neurogenesis. While it's unclear exactly what role neurogenesis plays in the compounds' effectiveness, scientists can use these compounds to figure out how certain drugs trigger neurogenesis and then try to find or design compounds that boost new cell growth even more effectively in the specific parts of the brain damaged in a particular disease.

In Parkinson's disease, patients lose neurons that produce dopamine, an important signaling molecule in the brain. The disease is currently treated with drugs that replace or mimic dopamine, stimulating dopamine receptors on brain cells. While these drugs can alleviate some of the movement disorders that plague Parkinson's patients, they tend to lose their effectiveness over time.

In a study released last week in *The Journal of Neuroscience*, scientists found that a drug similar to those used to treat Parkinson's disease can spur growth of new neurons in the brain area damaged in the disease. Scientists found that treated animals had twice the number of proliferating neurons as control animals, and that many of the newly generated cells appeared to develop into dopamine neurons. In addition, the animals showed an 80 percent improvement in their motor ability. "The effects were really quite profound," says [Christopher Eckman](#), a neuroscientist at the Mayo Clinic College of Medicine in Jacksonville, FL who led the study.

The findings are the first to show that boosting innate neurogenesis can help an animal model of Parkinson's disease. But preliminary research suggests an approach might work for a range of neurological and psychiatric disorders. Earlier this year, Greenberg and colleagues published a paper showing that drugs used to treat Alzheimer's disease also boost growth of brain cells. In addition, antidepressants such as Prozac, which increase the amount of certain neurotransmitters in the brain, spur growth of nerve cells in the hippocampus. Some research suggests this effect is crucial for the drug's ability to alleviate depression. "I think there is a fundamental biology here that is probably true across the board," says Eckman.

Several drug development companies are already banking on the idea. Scientists at [BrainCells](#), a startup based in San Diego, CA, screen compounds for those that can boost growth of stem cells and transform them into new neurons. [Neuronascent](#), a biotechnology company in Clarksville, MD, uses a similar screening method to

search for new Alzheimer's therapies.

Eckman's team is testing more drugs, some of which are currently used to treat Parkinson's disease, to see if they also trigger neurogenesis when given at high doses. If so, the researchers will try to determine an optimal dosing regimen for patients. They ultimately hope to find compounds that will help replace lost cells in a range of neurodegenerative diseases, such as Alzheimer's or Huntington's disease.

While Eckman is unsure exactly how these drugs trigger the birth of new cells, he thinks that chronic administration of signaling molecules, such as dopamine or serotonin, may mimic what's happening during development, when new neurons differentiate into specific types of cells and form the appropriate connections with other parts of the brain.

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