

Medical Marijuana

By: <http://www.parkinson.org>

With medical marijuana now legalized in 29 states and Washington, D.C., it is obvious that there is strong interest in its therapeutic properties. Researchers are testing marijuana, which is also called cannabis, as a treatment for many illnesses and diseases, including neurological conditions, with Parkinson's disease (PD) high on the list. But despite several clinical studies, it has not been demonstrated that cannabis can directly benefit people with PD.

The Science Behind Marijuana

What is the science and pharmacology behind marijuana, and can it be used to treat Parkinson's symptoms?

The **endocannabinoid system** is located in the brain and made up of **cannabinoid receptors** (a receptor is molecular switch on the outside of a cell that makes something happen inside a cell when activated) that are linked to **neurons** (brain cells) that regulate thinking and some body functions.

Researchers began to show enthusiasm to study cannabis in relation to PD after people with PD gave anecdotal reports and posted on social media as to how cannabis allegedly reduced their tremors. Some researchers think that cannabis might be neuroprotective — saving neurons from damage caused by PD.

Cannabinoids (the drug molecules in marijuana) have also been studied for use in treating other symptoms, like bradykinesia (slowness caused by PD) and dyskinesia (excess movement caused by levodopa). Despite some promising preclinical findings, researchers have not found any meaningful or conclusive benefits of cannabis for people with PD.

Researchers issue caution for people with PD who use cannabis because of its effect on thinking. PD can impair the executive function — the ability to make plans and limit risky behavior. People with a medical condition that impairs executive function should be cautious about using any medication that can compound this effect.

The Pharmacology of Cannabis

Marijuana contains more than 100 neuroactive chemicals that work with two types of cannabinoid receptors, **type 1 (CB1)** located in the brain and **type 2 (CB2)** located in the brain and peripheral immune system. Cannabinoids have powerful, indirect effects on these receptors, but researchers are unsure how. People with PD have less CB1 receptors than people who do not have PD. A boost to the CB1 receptor through an agonist, like marijuana, can improve tremors and may alleviate dyskinesia. Similarly, the other receptor, CB2, is also being studied to determine if it can modify the disease or provide neuroprotective benefits. However, a unified hypothesis does not currently exist for either receptor because there is too much conflicting data on the effectiveness of cannabinoids and these receptors.

Cannabis can contain two different types of molecules that interact with cannabinoid receptors: agonists and antagonists. An **agonist** is a drug that attaches to the same receptor as a natural chemical and causes the same effect. A **dopamine agonist** is a drug that is not dopamine, but attaches to the dopamine receptor. An **antagonist** is different as it attaches to the receptor, but blocks the action of the natural chemical. Medical marijuana can contain both cannabinoid agonists *and* antagonists. Recreational marijuana use is derived from its effects on agonists.

The varying amounts of cannabinoid agonists and antagonists in different marijuana plants makes cannabis studies difficult to conduct. When researchers study the effects of a medication, dosages are controlled and often set to a specific number of milligrams. When testing medical marijuana, the dosage administered can vary dramatically depending on the plant and method of administration.

Delta-9-tetrahydrocannabinol (THC)

THC is a primary component of marijuana. Cannabidiol is the other primary component. THC has a long latency of onset and cannot be easily measured for a therapeutic or medicinal dose. Medical marijuana studies primarily provide participants with THC and/or cannabidiol as a capsule, nasal spray or liquid formulation.

PD-Related Medicinal Marijuana Trials

The use of cannabinoids has been suggested to help with managing neurological and non-neurological conditions. Literature on medical marijuana is incredibly varied. Studies have not clearly supported the use of marijuana for PD. The clinical studies of cannabis as a PD treatment that have been conducted did not use the clinical trial gold standard of a double blind, placebo controlled trial design. Some studies had as few as five subjects.

While some results have been positive, the effects of medical marijuana are probably not completely understood, which is why more studies, especially those with more subjects, are needed. Most doctors don't support study results because these studies do not meet minimum research standards.

Below are several PD-related medical marijuana studies that have been conducted to evaluate the use of cannabinoids:

- [**The Therapeutic Potential of Cannabinoids for Movement Disorders:**](#) clinical observations and trials of cannabinoid-based therapies suggest a possible benefit to tics and probably no benefit for tremor in dyskinesias or PD motor symptoms. Further preclinical and clinical research is needed to better characterize the pharmacological, physiological and therapeutic effects of this class of drugs in movement disorders.
- [**Cannabinoids Reduce Levodopa-induced Dyskinesia in Parkinson's Disease: A Pilot Study:**](#) the authors demonstrate that nabilone, the cannabinoid receptor agonist, significantly reduces levodopa-induced dyskinesia in PD.
- [**Neurokinin B, Neurotensin, and Cannabinoid Receptor Antagonists and Parkinson Disease:**](#) evaluation of the effects of three antagonists on the NK3, neurotensin and cannabinoid receptors on the severity of motor symptoms and levodopa-induced dyskinesias after administration of a single dose of levodopa in 24 patients with PD. The study concluded that the drugs tested were safe, but did not improve Parkinsonian motor disability.
- [**The Endocannabinoid System as an Emerging Target of Pharmacotherapy:**](#) reviews the endocannabinoid system and its regulatory functions in health and disease.

Risks and Benefits for People with PD

There are risks and benefits associated with the use of cannabis for people with PD. Benefits include a possible improvement in anxiety, pain management, sleep dysfunction, weight loss and nausea. Potential adverse effects include: impaired cognition (impairment in executive function), dizziness, blurred vision, mood and behavioral changes, loss of balance and hallucinations. Chronic use of marijuana can increase risk of mood disorders and lung cancer.

Medical Marijuana and Legislation by State

Washington, D.C., and 29 states passed legislation allowing the use of marijuana-based products for medical purposes. Three of those states (Minnesota, New York and Ohio) do not allow it to be smoked. In some states patients must register to possess and use cannabis. Other states require patients to acquire a document from a physician stating that the patient has an approved condition. Under federal law doctors cannot prescribe cannabis, but many states authorize them to issue certifications that allow patients to obtain medical marijuana.

PD is a qualifying condition for medical marijuana in: Arizona, Connecticut, Florida, Illinois, Maine, New Mexico, New York, Pennsylvania and Rhode Island.

[Medical marijuana](#) is legal in: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Washington, West Virginia, and Washington, D.C. In Texas, medical marijuana is only approved for people with epilepsy.

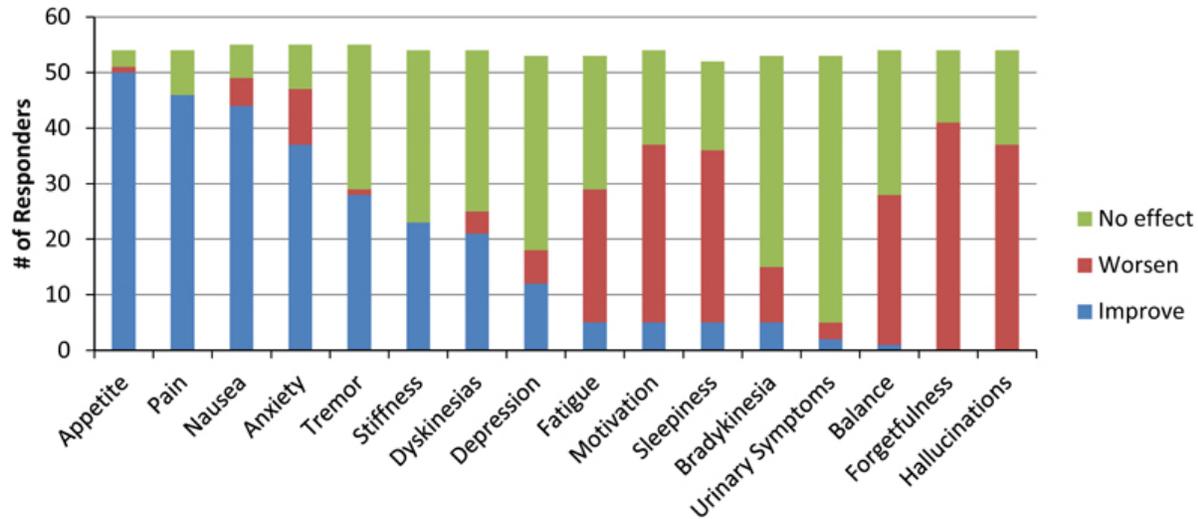
Parkinson's Foundation Centers of Excellence and Medicinal Marijuana

The Parkinson's Foundation, in partnership with Northwestern University researchers, studied attitudes about cannabis at 40 [Centers of Excellence](#). To the best of our knowledge, this is the first study to provide data on the practices, beliefs and attitudes of expert PD physicians concerning cannabis use.

The results were interesting: most experts said they knew what cannabis did, but disagreed on the details. While there is no general agreement on what the benefits might be for people with PD, the survey confirmed that cannabis is a popular subject within Parkinson's Foundation centers as 95 percent of neurologists reported patients have asked them to prescribe it.

Cannabis study results also included:

- Only 23 percent of physicians had any formal education on the subject of cannabis (such as a course or lecture), thus 93 percent of physicians want cannabis taught in medical school.
- Physicians reported that 80 percent of their patients with PD have used cannabis.
- Only 10 percent of physicians have recommended the use of cannabis to patients with PD.
- In terms of memory: 75 percent of physicians felt that cannabis would have negative effects on short-term memory and 55 percent felt that cannabis could have negative effects on long-term memory
- Only 11 percent of physicians have recommended use of cannabis in the last year



This graph shows how physicians expect cannabis would improve, worsen, or show no effect to PD-related symptoms given their expertise and observations of patients with PD.

The study emphasized that physicians would be more apt to the use of medical marijuana as a treatment if the drug was approved through regulation instead of legislation. Nearly all medications are only approved after passing a science-based evaluation proving their effectiveness in a process overseen by the U.S. Food and Drug Administration. Since cannabis has been approved through legislation rather than regulation, there are no labels, dosage recommendations or timing instructions that physicians can reference.

Is Medical Marijuana an Option for Me?

What's next for a person with PD who wants to know if medical marijuana is an option? "Marijuana should never be thought of as a replacement for dopaminergic and other approved therapies for PD," said Dr. Michael S. Okun, the Parkinson's Foundation National Medical Director.

Research is still needed to determine how medical marijuana should be administered and how its long-term use can affect symptoms of PD. To keep patients safe, states that legalize medical marijuana will eventually need to develop training programs for doctors and medical teams that prescribe medical marijuana. Consult your doctor to see if medical marijuana is an option for you.

Page reviewed by Dr. Bhavana Patel, Movement Disorders Fellow at the University of Florida, a Parkinson's Foundation Center of Excellence.