**How is PD Treated?**

[**http://www.parkinson.org/Parkinson-s-Disease/Treatment/Medications-for-Motor-Symptoms-of-PD**](http://www.parkinson.org/Parkinson-s-Disease/Treatment/Medications-for-Motor-Symptoms-of-PD)

Currently, there is no cure for Parkinson’s disease. Instead, therapy is directed at treating the symptoms that are most bothersome to an individual with Parkinson’s disease.  For this reason, there is no standard or “best” treatment for Parkinson’s disease that applies to every patient.  NPF is currently gathering the data to develop an individualized best approach to patient care.  Treatment approaches include *medication* and *surgical therapy*.  Other treatment approaches include general lifestyle modifications (rest and exercise), physical therapy, support groups, occupational therapy and speech therapy. In this section, you will become more familiar with the different types of medications commonly prescribed for PD, other alternative therapies, and surgical treatment options.  *Recent studies have implicated that a treatment is better than no treatment. In other words, medications and therapies may modify the progression of Parkinson’s disease.*

**Medications for Motor Symptoms**

Since most symptoms of PD are caused by the lack of dopamine in the brain, many Parkinson’s drugs are aimed at either temporarily replenishing dopamine or mimic the action of dopamine. These types of drugs are called dopaminergic. These medications generally help reduce muscle rigidity, improve speed and coordination of movement and lessen tremor.

Always remember that medication usage is only part of the whole treatment plan for effectively treating PD. Learn more about the available medications for the treatment of PD now.

**Caution**: PD medications may have interactions with certain foods, other medications, vitamins, herbal supplements, over the counter cold pills and other remedies.  Anyone taking a PD medication should talk to their doctor and pharmacist about potential drug interactions.

**Carbidopa/levodopa**

* Levodopa was developed in the late 1960s and was the first medication proven effective in treating a chronic neurodegenerative disease like PD.
* Levodopa in pill form is absorbed in the blood from the small intestine and travels through the blood to the brain, where it is converted into dopamine.
* Once the brain converts levodopa into dopamine, it is stored in the neurons until needed by the body for movement.
* Levodopa remains the single most effective agent in the management of Parkinson’s symptoms.
* Levodopa is almost always given in combination with another medication called Carbidopa (**Sinemet**). Carbidopa also a levodopa enhancer. When added, carbidopa enables a much lower dose of levodopa (80% less!) and helps reduce the side effects of nausea and vomiting.
* Carbidopa/levodopa tablets are available in immediate-release and slow-release forms as well as dissolvable tablets that are placed under the tongue.

 *Forty years after it was first introduced, levodopa is still the most effective medication available for the treatment of the motor symptoms?*

 *What are the Common Side Effects?*

* Nausea
* Vomiting
* Loss of appetite
* Lightheadedness
* Lowered blood pressure
* Confusion
* Dyskinesia The term dyskinesia describes involuntary, erratic, writhing movements of the face, arms, legs, and/or trunk, which usually occur one to two hours after a dose of levodopa has been absorbed into the bloodstream and is having its peak clinical effect. People who use levodopa longterm may experience dyskinesia at some point, usually three to five years after starting the medication.

*Eating Proteins with Levodopa/Sinemet*

* It is best to take Sinemet 30 to 60 minutes before eating a meal. This allows the Sinemet to be quickly absorbed before the food can interfere.
* Take the Sinemet along with foods that don’t contain proteins.
* Ginger tea is a good choice for many people, because it often “settles the stomach”.
* A graham cracker or soda cracker along with the ginger tea may help too.
* These foods are very low in protein and should not interfere with the absorption of Sinemet.

**Caution**: PD medications may have interactions with certain foods, other medications, vitamins, herbal supplements, over the counter cold pills and other remedies.  Anyone taking a PD medication should talk to their doctor and pharmacist about potential drug interactions.

**Dopamine Agonists**

Dopamine agonists are a different class of drugs than levodopa. While levodopa is converted in the brain into dopamine, dopamine agonists actually mimic the effects of dopamine without having to be converted. Dopamine agonists are often the first medication prescribed to treat PD, but can also be used in later stages of PD with carbidopa/levodopa.

The following are the most commonly prescribed dopamine agonists in the U.S.:

* Pramipexole (**Mirapex**) Approved by the FDA in 1997

 Effective in the early treatment of the motor symptoms of PD and plays an

 important role in controlling motor fluctuations.

* Ropinirole (**Requip**) Approved by the FDA in 1997

 Effective in the early treatment of the motor symptoms of PD and plays an

 important role in controlling motor fluctuations.

* Rotigotine (**Neupro patch**)

 Formulated as a once-daily transdermal (skin) patch that is changed every 24

 hours. Clinical trials have shown Neupro is just as effective as the oral

 dopamine agonists: pramipexole and ropinirole. The most common side effect

 is skin irritation, which is usually mild. Patients are able to tolerate the patch

 better when they rotate the sites where they adhere the patch. Although the

 patch was recalled in 2008 because of a manufacturing and quality control

 issue, it was reintroduced to the U.S. market in 2012, following improvements

 and a study of the new formulation.

* Apomorphine (**Apokyn**) Apomorphine was first used to treat PD in 1950, but

 it’s use was associated with many side effects, especially nausea and vomiting.

 In the 1990s apomorphine was released in a self-injectable form. It is now used

 as a “rescue” drug for people with advanced PD and severe “off” episodes. It

 can be used as many as five times per day as a “rescue” agent.

*Dopamine agonists can be used effectively as a single drug in early stages of PD or in combination with carbidopa/levodopa later on.*

*What are the Side Effects?*

* Excessive daytime sleepiness
* Visual hallucinations
* Confusion
* Swelling of the ankles
* Dyskinesia (not as common)
* Compulsive behaviors (such as uncontrolled shopping, gambling, eating, and sexual urges.)

**Amantadine (Symmetrel)**

Initially developed as an antiviral medication to treat influenza in the 1960s and was coincidentally discovered as a treatment for PD. Amantadine usually provides only mild relief. It is seldom used in early stages of PD. Amantadine is used in combination with levodopa to treat dyskinesias. Most commonly available as 100 mg capsule, although liquid and tablet forms can also be obtained.

*Amantadine may be particularly beneficial in people with PD who have prominent tremor or bothersome levodopa-induced dyskinesia.*

*What are the Side Effects?*

* Nausea
* Lightheadedness
* Insomnia
* Confusion
* Hallucinations
* Swelling of the ankles
* LivedoReticularis – a lacey, purplish discoloration of the skin on the legs with some leg swelling. Occurs in less than 1% of people with PD treated with medication.

**Anticholinergic Drugs**

* The oldest class of medications used to treat PD; first used in the 1900s.
* Examples include **Artane** and **Cogentin**.
* These drugs are most helpful to younger patients with PD whose chief complaint is a tremor.

*Anticholinergic drugs are most helpful to younger patients with tremor predominant PD, though side effects may limit their usefulness.*

*What are the Side Effects?*

* Confusion
* Hallucinations
* Decreased short-term memory
* Dry mouth
* Blurry vision
* Urinary Retention

**COMT-inhibitors**

COMT-inhibitors are only effective when used in combination with levodopa.

When a person takes levodopa, an enzyme in the body call catechol-O-methyl

transerase (COMT) converts a portion of the levodopa into a form that is

useless. COMT-inhibitors block the COMT enzyme from converting levodopa into a useless form, thus making more levodopa in the brain available and helping to reduce PD symptoms.

* There are two COMT-inhibitors on the market: Entacapone (**Comtan**) and Tolcapone (**Tasmar**)
* Entacapone is prescribed with each dose of levodopa, whereas tolcapone is taken three times a day, no matter how many doses of levodopa are prescribed. Due to earlier instances of liver function abnormalities during clinical trials of tolcapone, the FDA mandates that blood tests of liver function be conducted at the beginning of the treatment and, every 6 months after beginning treatment.
* There is also a medication called **Stalevo**, which is a combination of carbidopa, levodopa and entacapone. It is useful in people with advanced PD who experience motor fluctuations.
* The U.S. Food and Drug Administration (FDA) is evaluating clinical trial data that may suggest that patients taking Stalevo for PD may be at an increased risk for developing prostate cancer. One trial showed higher incidence of prostate cancer, another apparently did not. More data from these trials is needed to reach a conclusion.  FDA's review of Stalevo is ongoing and no new recommendations about the use of this drug have been made. For more information, read the [FDA Safety Announcement](http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm206363.htm) (3/31/2010).
* The U.S. Food and Drug Administration (FDA) is evaluating clinical trial data that may suggest that patients taking Stalevo for PD may be at an increased risk for cardiovascular events. The FDA has not concluded that Stalevo increases your risk of heart attack, strokes, or cardiovascular death. The Agency is still reviewing the available information about this safety concern. Do not stop taking your Stalevo or Comtan unless instructed to do so by your healthcare professional. Make sure your healthcare professional knows if you have a history of cardiovascular disease. For more information, read the [FDA Safety Announcement](http://www.fda.gov/Drugs/DrugSafety/ucm223060.htm#sa) (8/20/2010).

*COMT-inhibitors extend the benefit of levodopa by reducing “off” symptoms between doses. Without levodopa, COMT-inhibitors have no effect on Parkinson’s symptoms.*

*What are the Side Effects?*

* May exaggerate some levodopa-related side effects especially dyskinesia.
* Confusion
* Hallucinations
* Discoloration of urine (reddish brown or rust-colored)
* Diarrhea

**MAO-B inhibitors**

MAO-B is an enzyme in our brain that naturally breaks down several chemicals in our brain including dopamine. MAO-B inhibitors help to block the break down of dopamine in the brain, thus making more dopamine available and reducing some of the motor symptoms associated with PD.

* The MAO-B inhibitor Selegiline (**Eldepryl**) was previously thought to be neuroprotective, meaning that it could stop the death of dopamine-producing neurons and delay the progression of symptoms in PD.
* Studies of the second-generation MAO-B inhibitor rasagiline (**Azilect**) showed that 1 mg per day had benefits consistent with the possibility that the drug has a disease-modifying effect which slows disease progression.  While larger doses showed no such effect, if this can be confirmed, this would be the first drug determined to have a disease modifying effect in PD.
* Today, neurologist agree that MAO–B inhibitors provide modest improvements in early disease and adjunctively enhance dopaminergic function later in the disease.
* MAO-B inhibitors are usually used as early monotherapy or as an add-on medication to drugs such as levodopa in more advanced PD to decrease “off” time.

**The MAO-B inhibitors selegiline (Eldepryl) and Rasagaline (Azilect) enhances the effect of levodopa**:

Selegiline is available in two formulations:

* Standard oral—converted into an amphetamine like by-product, which may contribute to side effects of jitteriness and confusion.
* Orally-disintegrating (**Zelpar**) – preferred form for people with PD who have difficulty swallowing.

Rasagiline is available in 0.5mg and 1mg doses:

* The MAO-B inhibitor rasagiline (Azilect): is generally given in 1 mg doses once a day.   Two studies (LARGO and TEMPO) have shown that it can reduce wearing off in Levodopa treated patients.
* Recent studies have led to the reclassification of these medications as highly selective MAO-B inhibitors. Food restrictions have been relaxed by the FDA. However, there may be contraindications with other prescription medications, vitamins, over the counter cold pills, and homeopathic remedies. Anyone taking a PD medication should talk to their doctor and pharmacist about potential drug interactions.

*What are the Side Effects?*

* Mild nausea
* Dry mouth
* Lightheadedness
* Constipation
* Confusion (can occur in the elderly person with PD)
* Hallucinations (can occur in the elderly person with PD)

In monotherapy rasagaline dopaminergic side effects were very similar or better than Placebo.

**Generic vs. Branded Drugs for Parkinson’s Disease**

Currently, there are multiple pharmaceutical companies that manufacture a generic formulation of carbidopa/levodopa, dopamine agonists, monoamine oxidase inhibitors and anticholinergics.  If you have Parkinson’s, are taking brand name medication and then are offered a generic substitution for one of your Parkinson’s medications, you should know that the FDA requires that generic drugs must show an “essential similarity” to the branded drug prior to market approval, but that in some cases, this standard is not high enough.  [A review supported by NPF](http://www.ncbi.nlm.nih.gov/pubmed/21367644) chronicles compelling evidence that if you are in more advanced stages of the disease, switching from branded drugs to generic, or from one generic to another, may have adverse effects.  The authors, including NPF National Medical Director Dr. Michael S. Okun, believe that the standards for approving generic drugs for Parkinson's may not be strict enough to demonstrate that the generic alternatives are equally effective. Work with your physician to develop a tailored treatment plan.  Using generic drugs may provide a cost savings, but they may not be appropriate for you, especially if you already tolerate the branded drug.

If you make the switch, be sure to follow these tips:

* Report to your physician how effective the drug is
* Carefully keep a diary of any side effects
* Record dose adjustments that your physicians make (higher or lower)
* In general, try to stay with a single drug manufacturer for your generic medications (You may need to ask your pharmacist to special order for you)

When attempts to tailor drug therapy with a generic drug have been unsuccessful, have your doctor appeal to the insurance company for a branded drug.  It is important to include meticulous details of the various adverse side effects with the generic medication in your appeal letter.

**Resources for Prescription Assistance**

[NeedyMeds](http://www.needymeds.org/) The mission of NeedyMeds has been to make information about assistance programs available to low-income patients and their advocates at no cost. Databases such as Patient Assistance Programs and Disease-Based Assistance, government programs and other types of assistance programs are the crux of the free information we offer online.

[RxAssist](http://www.rxassist.org/) RxAssist offers a comprehensive database of pharmaceutical companies’patient assistance programs which provide free medications to people who cannot afford to buy their medicine. RxAssist also provides practical tools, news and articles so that health care professionals and patients can find the information that they need. All in one place.

[Rx Outreach](http://www.rxoutreach.com/Default.aspx)  Rx Outreach is managed by Express Scripts Specialty Distribution Services, Inc. (ESSDS), a fully-licensed mail order pharmacy that is committed to making the use of prescription drugs safer and more affordable. Rx Outreach is not a prescription insurance program nor an Internet pharmacy.

ESSDS developed Rx Outreach to provide a safe, affordable, and easy way for people of all ages to get medicines they need. The program offers prescription medicines to uninsured individuals and families, as well as those who have limited prescription drug coverage. Customer Service: 1-800-769-3880.

[Partnership for Prescription Assistance Program](http://www.pparx.org/Intro.php) 1-888-4PPA-NOW (1-888-477-2669) Their mission is to increase awareness of patient assistance programs and boost enrollment of those who are eligible. The Partnership for Prescription Assistance offers a single point of access to more than 475 public and private patient assistance programs, including more than 180 programs offered by pharmaceutical companies.

*With appreciation to the Parkinson’s Center Coordinators at Northwestern University, Oregon Health & Science University, Johns Hopkins University and Struther’s Parkinson’s Center for highlighting the resources cited above.*