

## Parkinson's disease

The main symptoms of Parkinson's disease are usually stiffness, shaking (tremor), and slowness of movement. People with Parkinson's may also develop other symptoms (listed below). Symptoms typically become gradually worse over time. Treatment often provides good relief of symptoms for several years.

### What is Parkinson's disease?

Parkinson's disease is a progressive neurological degeneration of certain cells (called dopaminergic cells) within a specific part of the brain (substantia nigra). The deficiency of dopamine leads to a movement disorder with Parkinson's disease symptoms.

### Parkinson's disease symptoms

The brain cells and nerves affected in Parkinson's disease (PD) normally help to produce smooth, co-ordinated movements of muscles. When this system goes wrong, movement disorders (motor symptoms) occur. Three common PD symptoms that gradually develop are:

- **Slowness of movement (bradykinesia)**. For example, it may become more of an effort to walk or to get up out of a chair. When this first develops you may mistake it as just 'getting on in years'. The diagnosis of PD may not become apparent unless other symptoms occur. In time, a typical walking pattern often develops. This is a 'shuffling' walk with some difficulty in starting, stopping and turning easily.
- **Stiffness of muscles (rigidity)** and muscles may feel more tense. Also, your arms do not tend to swing as much when you walk.

- **Shaking (tremor)** is common, but does not always occur. It typically affects the fingers, thumbs, hands and arms but can affect other parts of the body. It is most noticeable when you are resting. It may become worse when you are anxious or emotional. It tends to become less when you use your hand to do something such as picking up an object.

The symptoms in the early stages of Parkinson's disease tend to be mild but slowly become worse. However, the speed at which symptoms become worse varies from person to person. It may take several years before they become bad enough to have much effect on your life. At first, one side of your body may be more affected than the other.

Some other symptoms may develop due to problems with the way affected brain cells and nerves control the muscles. These include:

- Fewer facial expressions such as smiling or frowning. Reduced blinking.
- Difficulty with fine movements such as tying shoe laces or buttoning shirts.
- Difficulty with writing (handwriting tends to become smaller).
- Difficulty with balance and posture and an increased tendency to fall.
- Speech may become slow and monotonous.
- Swallowing may become troublesome and saliva may pool in the mouth.
- Tiredness and aches and pains.

Various other symptoms develop in some cases, mainly as the condition becomes worse. Symptoms include:

- [Constipation](#).
- Bladder symptoms and sometimes [incontinence](#).
- Hallucinations - seeing, hearing or smelling things that are not real.
- [Sweating](#).

- Sexual difficulties.
- Alterations in your sense of smell.
- Sleep problems.
- Weight loss.
- Pain.
- [Depression](#).
- [Anxiety](#).
- [Dizziness](#) on standing (due to a sudden fall in blood pressure).
- Problems with controlling impulses. For example, compulsive eating, shopping or gambling. (This could be linked to some types of medication – see 'Which medicines are used to treat Parkinson's disease?' section, below.)

Also, for reasons that are unclear, people with a medical history of PD have an increased risk of developing melanoma skin cancer. So, if you have PD, you should ensure that you use sun cream, stay out of the sun in the hottest part of the day, wear a sunhat and protect your skin from the sun where possible. See the separate leaflets called [Melanoma Skin Cancer](#) and [Sun and Sunburn](#) for more details.

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## Parkinson's disease stages

There are 5 stages of Parkinson's disease, according to the severity of the symptoms:

- **Stage 1:** the earliest stage. Features include mild tremors and mild difficulty with walking. There may also be less facial expressions, but the symptoms do not greatly interfere with daily life.
- **Stage 2:** the symptoms become worse, particularly tremors and difficulty moving. Daily tasks are more difficult but still possible to complete independently.
- **Stage 3:** balance and coordination are now also affected, with falls a more likely possibility. Help is needed for some tasks such as dressing and feeding.

- **Stage 4:** tasks become much harder and aids, such as walking aids, may be needed. Most tasks require help.
- **Stage 5:** the most severe stage. It may be difficult to stand and walk even with help. Most likely may need a wheelchair or may be bed-bound. New symptoms, such as hallucinations or delusions, may develop.

## What causes Parkinson's disease?

PD is a disorder of the nervous system. A small part of the brain, called the substantia nigra, is mainly affected. This area of the brain sends messages down nerves in the spinal cord to help control the muscles of the body. Messages are passed between brain cells, nerves and muscles by chemicals called neurotransmitters. The brain cells in the substantia nigra produce dopamine, the main neurotransmitter.

If you have PD, a number of cells in the substantia nigra become damaged and die. The exact cause of this is not known. Over time, more and more cells become damaged and die. As cells are damaged, the amount of dopamine that is produced is reduced. A combination of the reduction of cells and a low level of dopamine in the cells in this part of the brain causes nerve messages to the muscles to become slowed and abnormal.

The risk of developing Parkinson's disease seems to involve genetic and environmental factors. Parkinson's disease can run in families as a result of faulty genes, Some chemicals, such as pesticides and herbicides, and pollution may contribute. However Parkinson's disease is not an inherited condition and there is currently no strong evidence to link any particular gene or chemical to Parkinson's disease.

## Who develops Parkinson's disease?

PD mainly develops in people over the age of 50. It becomes more common with increasing age. About 5 in 1,000 people in their 60s and about 40 in 1,000 people in their 80s have PD. It affects men and women but is a little more common in men. Rarely, it develops in people under the age of 50.

PD is not usually inherited and it can affect anyone. However, one type of PD, which appears in the small number of people who develop it before the age of 50, may be linked to inherited (genetic) factors. Several family members may be affected.

## Does Parkinson's disease cause dementia?

The cells in the brain affected in PD are not in the 'thinking' parts of the brain and [dementia is not a typical early feature of PD](#). However, if you have PD you have an increased risk of developing dementia.

About half of people with Parkinson's disease develop dementia at some stage. If dementia occurs, it tends to develop in older people with PD (aged over 70). Early dementia in younger people with PD virtually never develops.

It is thought that PD alone does not cause dementia; however, other age-related factors in addition to PD may increase the risk of dementia developing.

## How is Parkinson's disease diagnosed?

There are no tests that can conclusively show that you have Parkinson's disease. Diagnosing Parkinson's disease is based on symptoms.

If your GP suspects that you may have Parkinson's disease, you will be referred to a neurology specialist. You will likely have some tests in hospital to rule out other causes of your symptoms, such as a brain scan.

## Parkinson's disease treatments

There is no cure for PD, and no treatment prevents the disease from progressing. However, treatments can usually ease symptoms.

- At first, you may not need any treatment when the symptoms are mild. A specialist may simply see you every now and then to monitor how the disease is progressing.
- A medicine that eases symptoms is usually started when symptoms become troublesome.
- Therapies such as physiotherapy, occupational therapy and speech therapy may also be useful as the disease progresses.

- Surgery may be an option for severe cases.

The National Institute for Health and Care Excellence (NICE) has just approved a few devices to help monitor people's symptoms. This is because people's symptoms come and go or they just might not remember. Assessing symptoms is so important in personalising treatment plans and making sure the medication is right, increased or changed on time to improve quality of life.

The devices currently approved are: Kinesia 360, KinesiaU, PDMonitor, Personal KinetiGraph (PKG) and STAT-ON. Your doctor will decide whether a device is appropriate for you and which one would suit you better if needed.

## **Which medicines are used to treat Parkinson's disease?**

Guidelines recommend starting with a dopamine agonist, levodopa with a dopa-decarboxylase inhibitor or a monoamine-oxidase inhibitor. Other medicines are also sometimes used, usually in addition to one of these three main types of medication.

### **Levodopa**

This medicine has been used for many years. Nearly all people with PD notice a good improvement in symptoms after starting levodopa. The body converts levodopa to dopamine. Therefore, the low level of dopamine in the affected part of the brain increases with levodopa. A low dose is usually started at first. Over time, the dose often needs to be increased to control the symptoms.

Levodopa is always combined with another medicine (either benserazide or carbidopa). These prevent levodopa from being converted into dopamine in the bloodstream. This reduces side-effects and increases the amount that gets to the brain where it is converted to dopamine. The combination of levodopa and benserazide is called [co-beneldopa](#) and the combination of levodopa and carbidopa is called [co-careldopa](#).

Side-effects sometimes occur when you first start levodopa. However, most people have no problems with low doses. Read the leaflet in the medicine packet for a full list of possible side-effects.

Feeling sick ([nausea](#)) is the most common. This is less likely to occur if you take a small dose at first and then gradually build it up. If nausea is a problem, then it can usually be eased by an [anti-sickness medicine](#). Compulsive behaviour may occasionally be a side-effect of levodopa.

Levodopa tends to work less well over time. Therefore, the dose usually needs to be increased every now and then. Unfortunately, over time as the dose increases (typically after several years), most people taking levodopa develop problems. These include 'on-off' effects.

When this occurs, you can switch quite suddenly between being 'on' and able to move to being 'off' and immobile. Muscle problems also commonly develop which can cause uncontrollable jerky movements and other effects (dyskinesias). These problems related to long-term use of levodopa can become quite disabling, tiring and painful.

A Duodopa® pump is sometimes offered to people with severe movement problems who don't respond to medicine taken by mouth. This consists of a small pump with a tube which passes through the skin. It delivers a steady flow of a combination of levodopa and carbidopa to the upper part of the small intestine.

## **Dopamine agonists**

Dopamine agonists are medicines that act on the same receptors in the brain as dopamine. So, in effect, they act like a substitute for dopamine. Unlike levodopa, they do not need to be converted in the body to become active. There are several types. [Ropinirole](#), [pramipexole](#) or [rotigotine](#) are used most commonly.

Possible side-effects when one is first started are similar to levodopa (nausea, etc). However, the side-effects tend to ease off over several days or weeks. Again, if nausea is a problem, it can usually be eased by an anti-sickness medicine. Also, drowsiness can occur with these medicines.

Drowsiness may be severe and may affect your ability to drive. Impulsive and compulsive behaviour can be a side-effects and are more common with this group of medicines than with levodopa. Impulsive behaviour means that a person has difficulty controlling the urge to carry out certain activities such as gambling or binge eating. Compulsive behaviour means that a person has an overwhelming urge to act in a certain way to reduce stress, such as repetitive washing of their hands.

Other side-effects are less common but read the leaflet in the medicine packet for a full list of possible side-effects.

Sometimes a dopamine agonist is used in combination with levodopa in the later stages of PD. [Apomorphine](#) is another dopamine agonist that is used in combination with levodopa. It needs to be given by an injection under the skin. It is used in people who have PD in its later stages who have severe 'off' episodes where they become immobile. It can help to reverse these 'off' episodes but its effect only lasts for about an hour. Frequent injections are therefore needed.

Because of this, sometimes the medicine is given as a continuous infusion, using tubing with a needle at the end (called a cannula) that is inserted under the skin so that the medicine can flow into your body.

### **Monoamine-oxidase-B (MAO-B) inhibitors**

These medicines are another alternative to levodopa for early PD. They include [selegiline](#), [rasagiline](#) and safinamide. These medicines work by blocking (inhibiting) the effect of a chemical in the brain called MAO-B. This chemical is involved in the breakdown of levodopa and dopamine. If the action of MAO-B is inhibited then the effect of any dopamine lasts longer.

Most people will require levodopa eventually. However, if you take an MAO-B inhibitor at first, it may delay the need for levodopa for months or years.

Sometimes these medicines are used in combination with levodopa in the later stages of PD.

### **Other medicines used for PD**

- Catechol-O-methyltransferase (COMT) inhibitors are relatively new medicines. They include [tolcapone](#), [entacapone](#) and opicapone. These help to stop the breakdown of levodopa by the body, so more of each dose of levodopa can get into the brain to work. A COMT inhibitor is sometimes advised in addition to levodopa when symptoms are not well controlled by levodopa alone.



- Other medicines are sometimes used to help relieve symptoms. They have various effects which try to correct the chemical imbalance in the brain. They include beta-blockers, amantadine and anticholinergic medicines. One of these may be tried when symptoms are mild. However, you are likely to need levodopa or a dopamine agonist at some point.

Various things may influence which medicine is advised. For example, your age, severity of symptoms, how well your symptoms respond to treatment, if side-effects develop, other medicines that you may take, etc. Your specialist will advise on the best medicine for you to take.

Whatever medicine or medicines you are prescribed, read the leaflet in the medicine packet for a full list of possible side-effects. Mention to your doctor if you develop a troublesome side-effect. A modification of the dose, dose schedule, or the type of medication, may be possible to help keep side-effects to a minimum.

The dose of the medicine that you start with usually needs to be increased over time. In time, combinations of medicines may be required for best control of symptoms. The treatment schemes and doses can vary greatly from person to person. As the disease progresses, the symptoms may not be so well controlled by medicines.

## **Other treatments for Parkinson's disease**

### **A specialist nurse**

A specialist PD nurse is available in many PD clinics, to provide support, information and counselling. A specialist nurse can also monitor response to treatment and give advice on how to adjust medication if necessary.

### **Therapies**

For example:

- A physiotherapist can advise on posture, walking and exercises.
- An occupational therapist can advise on such things as home adaptations which may ease many tasks.
- If difficulties with speech, swallowing or saliva occur, a speech and language therapist can help.

- The advice of a dietician and other therapists may be needed for some people.
- A psychologist may be able to help if you have problems with depression.

## Surgery

Surgical techniques are being developed which may help some people who have had PD for several years. Surgery does not cure PD but may help to ease symptoms when medicines are not working well. For example, deep brain stimulation is a technique that involves putting a pulse generator (like a heart pacemaker) in the chest wall.

Fine cables are tunnelled under the skin to electrodes placed in the brain. The electrodes stimulate the parts of the brain that are affected by PD and can help to ease symptoms. The long-term safety of this surgery is not certain and a trial is underway to look at this.

## Complementary therapies

[Complementary therapies](#) do not affect symptoms or the course of the disease. However, some therapies are good at easing stress and anxiety, which may help in your general well-being. Beware of any treatment that claims to 'cure' PD.

## Some other general points

**Stay as active as possible.** Exercise regularly as much as you are able. This may not be possible when the condition is more advanced. However, it is something to consider when symptoms are not too bad. You may walk more slowly than before but a daily walk is good exercise and may help to loosen up stiff muscles.

Well-meaning relatives or friends may tell you to rest and take things easy. However, as much as possible and for as long as possible, resist the temptation for others to do things for you just because it may be quicker.

**Constipation** is common in people with PD. Help to reduce the chance of this by having lots to drink and eat plenty of vegetables, fruit, and foods high in fibre. Exercise can also improve constipation. Sometimes [laxatives](#) may be needed to treat constipation.

**Some medicines** taken for other conditions can interfere with dopamine and make PD worse. These may be prescribed for such things as mental illness, sickness, [vertigo](#) and dizziness. Check with your doctor if you are unsure about any medicines that you take.

**Medication.** Make sure you know exactly when to take your medication. Dose schedules and timings are important. A pharmacist will be able to advise and help if you have difficulty in getting tablets out of blister packs, have difficulty in remembering when to take your medicines, or have any other queries about medication.

Report any suspected side-effects to your doctor. For example, seeing or hearing things (hallucinations), confusion and mental changes are possible side-effects of some medicines used to treat PD.

**Driving.** If you are a driver you should tell the DVLA and your insurance company if you develop PD. Your insurance may be invalid if you do not. Depending on the severity of symptoms and the medicines that you are taking, you may still be allowed to drive following a medical assessment.

**Depression** is common in people with PD. Depression can cause symptoms which may seem as if PD is getting worse (such as lack of energy and becoming slower). If you seem to become worse quite quickly, over a few weeks or so, depression may be the cause. Tell your doctor if you suspect this. Depression can often be treated.

**Some practical tips** may help. For example: it is easier to get up from a high chair than from a low couch; consider using Velcro® fasteners instead of buttons; carrying a walking stick when out may increase your confidence if unsteadiness is a problem. Parkinson's UK has plenty of further advice on coping and living with PD.

## What is the outlook (prognosis)?

The symptoms of PD tend to become gradually worse over time. However, the speed of progression varies greatly from person to person. When symptoms first begin, you may not need treatment when symptoms are relatively mild.

Most people with PD can expect to have some time of relatively mild symptoms. Then, when the symptoms become worse, they can expect several years of good or reasonable control of the symptoms with medication.

But everyone is different and it is difficult to predict for an individual how quickly the disease will progress. Some people may only be slightly disabled 20 years after PD first begins, whereas others may be very disabled after 10 years.

## Research into Parkinson's disease

Research into PD is active. For example, one main aim of research is to find medicines that prevent the damage to the affected cells, rather than just treating the symptoms, which is the main value of treatment at present. Further research on these chemicals continues.

Research is underway using stem cell therapy to help treat PD. Other researchers are looking at alpha synuclein, a protein that gathers around the junction between nerve cells and is thought to affect the way messages are conducted between the brain and the nerves controlling movement.

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## Further reading

- [Deep brain stimulation for Parkinson's disease](#); NICE Interventional procedure guidance, November 2003
- [EFNS/MDS-ES recommendations for the diagnosis of Parkinson's disease](#); European Journal of Neurology (Jan 2013)
- [Summary of the recommendations of the EFNS/MDS-ES review on therapeutic management of Parkinson's disease](#); European Journal of Neurology (Jan 2013)
- [Parkinson's disease in adults](#); NICE guideline (July 2017)
- [Devices for remote monitoring of Parkinson's disease](#); NICE Diagnostics guidance, January 2023
- [Parkinson's disease](#); NICE CKS, January 2022 (UK access only)

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