Multiple Sclerosis Trust

MS

Disease modifying drugs

A guide to treatments for relapsing MS

MS Decisions

January 2023

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Contents

Introduction

Disease modifying drugs (DMDs) are a group of treatments for people with multiple sclerosis. Most DMDs are for people with relapsing remitting MS, but some can be prescribed for people with early progressive MS.

DMDs work on the underlying condition of multiple sclerosis but are not expected to change or improve your MS symptoms. You may have other drugs or treatments to deal with the MS symptoms that you experience.

There is a wide range of DMDs approved for use by the NHS in the UK. Each drug offers a different combination of benefits and risks. This guide explains what the DMDs are, will help you explore your options and discuss starting or switching between one of the drugs with your MS team. This guide is not intended as a substitute for clinical advice.

The online resource MS Decisions (mstrust.org.uk/msdecisions) can be used alongside this guide. It includes a decision aid to help you narrow down the drugs, compare up to three DMDs side-by-side and get in-depth information on each drug.

You might be reading this guide because:

- you are looking for a general introduction to the DMDs so that you can get familiar with the options for treatment
- you have seen your MS team, talked about starting treatment and want to know a bit more
- your neurologist has given you a short list which you want to weigh up before your next consultation
- you are already on a DMD and are considering switching to another one.

Every effort has been made to ensure that the information in this book is accurate and up to date (January 2023). This is a rapidly developing area of MS treatment with regular changes to NHS eligibility for existing drugs and approval of new treatments.

MS Decisions will be updated as eligibility criteria are amended or new DMDs become available. For the most up to date information visit mstrust.org.uk/msdecisions.

1. What is MS?

Multiple sclerosis is thought to be an autoimmune condition. Your immune system generally knows which tissues are part of your body and which are foreign – eg a virus or bacterial infection – and needs attacking. In autoimmune conditions, for reasons which are not known, the immune system attacks your own tissue. In MS, the immune system attacks myelin – the fatty protein that forms an insulating sheath around nerve cells in the central nervous system (your brain and spinal cord). This causes inflammation and damage to the myelin (called demyelination) which disrupts the way in which nerve messages are carried to and from your brain, leading to the symptoms of MS.

Eventually, if your nerves are left without the protection of myelin or the area of damage becomes too large, nerve fibres will degenerate and be permanently destroyed. Messages in that part of your central nervous system may become permanently blocked.

What are the different types of MS?

Although the effects of MS can vary greatly from person to person, there are three broad types. In addition, before being diagnosed with MS, people may experience a first episode of neurological symptoms, known as clinically isolated syndrome.

Relapsing remitting MS (RRMS)

Most people are diagnosed with relapsing remitting MS. This means they will have periods when symptoms flare up aggressively – known as a relapse, an attack or an exacerbation – followed by periods of good or complete recovery – a remission.

A relapse is the appearance of a new symptom or the reappearance of old symptoms that lasts more than 24 hours but more commonly, for a number of days or weeks. A relapse can last for considerably longer than that and may persist for weeks or months. The frequency of relapses, the severity of symptoms experienced and the length of the gap between attacks are unpredictable. It may sometimes be difficult to tell the difference between a relapse and day to day fluctuations in symptoms.

On average, people with early relapsing remitting MS have one or two relapses a year. You may not always recover completely from a relapse, although your level of disability usually remains steady between relapses.

In the NHS, DMDs are approved for prescription according to how frequently you have been having relapses and whether there is evidence of inflammation around your nerves.

Active RRMS

- if you have had two relapses in the previous two years

Very active RRMS

- **highly active despite treatment** – if you continue to have relapses even though you've been taking a DMD for a year

OR

- **rapidly evolving severe** – if you have had two or more severe, or disabling, relapses in the previous year and show areas of new damage (lesions) on two consecutive MRI scans.

Secondary progressive MS (SPMS)

Many people initially diagnosed with relapsing remitting MS find that over time, often many years, the frequency of relapses decrease and eventually stop but disability gradually increases. This is known as secondary progressive MS.

Some of the DMDs may be prescribed for people with SPMS who continue to have relapses or show signs of inflammation around their nerves.

Primary progressive MS (PPMS)

Around 1 in 10 people will be diagnosed with primary progressive MS in which disability increases from the outset with few or no relapses.

Some of the DMDs may be prescribed for people with PPMS who have relapses or show signs of inflammation around their nerves.

Clinically isolated syndrome (CIS)

When someone experiences their first episode of neurological symptoms it is referred to as a clinically isolated syndrome. Not everyone who experiences a CIS will go on to develop MS. For some it may be the first attack of what turns out to be MS. Your neurologist may recommend tests that may help to determine whether you are at risk of further episodes.

Some of the DMDs may be prescribed after a first relapse if MRI scans show you are at a high risk of further episodes; the aim is to delay or even prevent a second attack.

My MS diagnosis

Questions for my MS team about my diagnosis.

2. What are disease modifying drugs?

Disease modifying drugs (DMDs) are a group of treatments for people with multiple sclerosis. DMDs work with different parts of the immune system to reduce the inflammation caused by MS to nerve cells in the brain and spinal cord.

What are the goals of treatment?

The main benefits of taking one of the DMDs are:

- fewer relapses
- any relapses you do have should be less severe (less likely to need steroids or a stay in hospital)
- reduce the build-up of disability which can occur if you don't recover completely from a relapse
- reduce areas of damage (lesions) in the brain and spinal cord which may help to reduce disability in the longer term even if you do not notice symptoms now.

It may take six to nine months for the drug to become fully effective so any benefits may not be immediately obvious.

Inflammation does not always result in a relapse or visible symptoms. This silent activity may mean that although you are feeling well, there may still be MS damage that can only be seen on a brain scan. MRI scans show that taking a DMD can lead to fewer, smaller or no new areas of damage (lesions) in the brain and spinal cord. The aim of DMD treatment is to stop all MS disease activity, both in the relapses you notice and in the changes that are only picked up on MRI scans.

DMDs are not able to repair nerve damage already caused by MS so they will not reverse any existing symptoms you may have. As they reduce inflammation and relapses they may prevent further symptoms or disability from developing.

If you have relapsing remitting MS or early progressive MS with relapses or inflammation you may benefit from taking a DMD.

Currently, if you have primary or secondary progressive MS with no relapses or inflammation, you are unlikely to be offered DMD treatment on the NHS.

How effective are disease modifying drugs?

It is hard to say whether one DMD is better than another. They work in different ways, and your personal experience with one drug may be different to someone else's experience.

Large scale clinical trials compare the number of relapses in people taking a new drug with those taking an existing DMD or placebo (dummy drug). Trials may also measure the number of lesions seen on MRI scans and changes in disability which last for three months or longer.

Each drug was developed at a different time and used different participants in their clinical trials. Once effective DMDs were in widespread use, clinical trials for new DMDs used older DMDs as the comparison drug, rather than an ineffective dummy drug. This means that it is hard to compare older and newer DMDs accurately.

Newer DMDs will have had to demonstrate that they are more effective than older DMDs or that they offer additional benefits before they were licensed for use. The benefits might include a reduction in side effects, alternative ways to take the drugs, or more flexible monitoring requirements.

In this guide, we've followed broad categories of effectiveness recommended in guidelines published by the Association of British Neurologists (ABN). These categories are only a general

guide, based on the reduction of relapses in clinical trials. In practice, your MS team may recommend some DMDs over other ones based on their professional assessment of your holistic healthcare needs.

- Moderately effective reduces relapses by around one third 30%.
- More effective reduces relapses by around one half 50%.
- Highly effective reduces relapses by around two thirds 70%.

Do disease modifying drugs reduce long term disability?

For most DMDs, clinical trials are conducted over two to four years, which means that the evidence on long term disability and disease progression is limited. However, several of the DMDs have now been in use in the UK and around the world for over two decades.

Researchers have compared people with MS taking DMDs with those not taking DMDs. They found that the group taking DMDs developed less disability and their MS progressed less quickly. However, the treatment effect wanes over the longer term. This implies that a person gets more long term benefit from a DMD if they start treatment when they are relatively younger and less affected by disability.

When is the right time to start treatment?

There is increasing evidence that it is best to begin treating RRMS early. This means starting DMDs soon after diagnosis. However, later is better than never, so if you are still having relapses after having had MS for some time, you could still benefit as the treatments may help prevent further damage from occurring.

It is important to raise the topic of starting treatment soon after diagnosis with your MS team. If it isn't mentioned in your appointment, it is OK for you to bring it up.

What are the possible side effects of disease modifying drugs?

There are a number of side effects associated with each of the DMDs (see individual drugs for more detail), but not everyone will experience them. Most of the side effects are relatively mild and your MS team will give you advice on how to reduce their impact. Most people find that side effects ease after the first month or two as their body adapts to the drug. A few people find side effects continue to cause problems so that they have to change or stop treatment.

Some of the DMDs are associated with less common but potentially serious and life-changing side effects. Your MS team will take steps to minimise the risks if you are taking one of these drugs, such as giving advice on warning signs, carrying out additional tests and check-ups. If there is any cause for concern, your MS team will step in quickly. Despite the reassurance of regular monitoring, some people may feel that they are unwilling to take the risk of developing serious side effects. Others may feel that the benefits of a drug outweigh the risks.

What are the alternatives to disease modifying drugs?

Some people with very active and rapidly worsening MS may be offered a treatment called autologous haematopoietic stem cell transplantation (aHSCT or HSCT). This treatment aims to reset your immune system and stop it from attacking your myelin. You can read more about aHSCT in our web page mstrust.org.uk/a-z/stem-cells-and-ms-ahsct

3. Making your choice

The decision to start a DMD should be made in partnership with your MS team. They have knowledge and experience in managing MS and can advise on which treatments might be right for you and your MS. You are the expert on your own life and what matters to you. Bringing together your preferences with the experience of your MS team can help you make a choice that is the best balance between the effectiveness of a drug and how well it suits your circumstances.

This section aims to help you think about your own views, preferences and attitude to risk. Knowing about the available options and what is important to you will help you make an informed choice.

It is up to you how much you want to be involved in choosing your treatment. You might want your neurologist and MS nurse to take the lead or you might prefer to be very involved.

Considering what is important to you

Starting any DMD is a long term commitment, so it is important you have as much information as you feel you need to make your decision.

As you go through this section, you might want to think about:

- What is important to you?
- What do you want to achieve by taking one of the DMDs?
- How do you usually make decisions? On your own or do you often rely on advice from others?
- Are you a risk taker or more cautious?
- Do you like to get background information and weigh up the pros and cons or do you prefer to rely on gut instinct?

Your personal circumstances and commitments

Starting treatment with one of the DMDs is likely to have some impact on your life. At the very least you need to take it at the prescribed times. For some of the DMDs there are additional commitments you need to make. Some require you to go to the hospital for treatment, some require regular monitoring, for example blood tests, and others might need to be stored in a particular way.

Below are a number of topics and questions you might think about when you consider your treatment options. They will help you work out how much these factors may influence your choice.

Family

Are you considering becoming pregnant soon? Some DMDs can affect sperm production, or may not be suitable during pregnancy or breastfeeding. You would need to discuss your options in more detail with your MS team. See Sections 5 and 6 for more details.

If you already have children, do you have a support network that could help if you need to attend clinics at a time when you also have family commitments? Will taking a drug have an impact on your daily routines?

Work

If you travel a lot with work, work unusual hours or on shifts, what impact might that have? Could you take your doses at the right times? How easy would it be for you to attend regular check-ups?

You may not have told your employer about your MS diagnosis, especially if your MS is not having an impact on your work. If you need time off for treatment or tests, you might need to think

about how you can arrange your appointments, or find a way you can have the necessary time off without raising concern if you are not yet ready to tell people.

Holidays

Do you like remote or extended holidays? Or are you planning on going travelling for a long period? You might need to make arrangements with your MS team to ensure you can take your medication with you so that you can continue treatment uninterrupted.

Transport

If you rely on public transport or for someone else to take you to appointments, you might like to consider how easy or cost effective it would be to get to the clinic where your treatment or monitoring might take place.

Health

Do you have any other health conditions? It is important to let your MS team know about any other conditions you have or other drugs you take. You may also want to consider whether a potential DMD side effect might aggravate your pre-existing condition.

Infections

Some DMDs affect how susceptible you might be to infections such as colds, chest infections or urinary tract infections. Your MS team can advise you on how best to protect yourself in daily life.

Vaccines

Some DMDs affect how well vaccines work to protect you from disease. You may be advised to avoid certain vaccines or take them at particular times. Your MS team will be able to advise you on the best vaccination plan for you.

Storage and supply

As some of the drugs need to be stored in the fridge, you might need to consider if this is possible for you. If you share a house with others, can you store your drugs safely in a shared fridge?

The consequences of no treatment

As MS is such a variable condition it is difficult to know how your MS will develop, predict how many relapses you will have and when these will occur. If you have had very few relapses or you currently feel well, you may feel that you do not want to start drug treatment. You may wish to continue life as you were before.

As explained in Section 2, relapses may be just the tip of the iceberg when it comes to MS, and there can be other activity going on beneath the surface that you might not be aware of. Without DMD treatment you may be at risk of further relapses and permanent nerve damage.

Ensuring you are eating a balanced diet, taking regular exercise and not smoking can help you be as healthy as possible and reduce your risk of developing other health conditions too. There is clear evidence that stopping smoking will have positive benefits for your MS. Lifestyle changes, complementary medicines and dietary supplements can often be helpful for people with MS, but they are not a substitute for DMD treatment.

It is important to remember that even if you decide that you do or do not want to start treatment now, you can change your mind later. You should get the opportunity to review your treatment plan with your MS team regularly.

Weighing up the pros and cons

The pros and cons of each of the treatment options should form part of your discussion with your MS team. Pros will include the benefits you expect to gain from taking one of the DMDs and things you consider to be an advantage such as the ease of taking a particular drug. Cons may

include the risk of certain side effects or the inconvenience of going to a clinic for regular tests. Each person will have very different ideas of what they consider to be pros or cons.

Sometimes you may need to make trade-offs. To receive the benefits of a particular treatment you might need to be willing to accept the possibility of particular risks or the inconvenience of going for regular treatment or tests.

Guidance from your MS team

Your MS team will tell you if you are eligible for DMDs and if so which ones would be suitable for you and your MS. They will make recommendations based on how active your MS has been, the number of relapses you have had and how these have affected you. When prescribing a DMD, your MS team has to work within strict NHS criteria which define the type of MS the drug can be used for. DMDs can only be prescribed by a neurologist , consultant nurse, pharmacist or allied health professional.

Like you, your MS team will have their own views on the best course of action to take. They may weigh up the pros and cons of each option in a different way to you and may have a different perspective. Some might suggest a riskier course of action for bigger benefits and some may recommend a more cautious approach.

Your MS team is there to support you in the management of your MS, so do take account of their advice but feel free to ask them questions and explain your own preferences if you have any concerns. You can find sample questions to ask at the end of this book.

If after further discussions, you are not happy with the treatment choices you are offered, you are entitled to ask for a second opinion. Your GP can refer you for a second opinion; although there is no legal right to a second opinion, requests are usually accepted but may take some time.

What matters to me

Notes on my life and my priorities to share with my MS team.

4. Starting, switching and stopping

Starting treatment

Will I have to pay for my DMD?

If you are eligible for NHS treatment, you will not have to pay for the DMD itself.

How will I get my supply of my DMD?

Depending on which drug you are prescribed, you may either collect it from the hospital pharmacy, receive it in hospital as a day patient, or have it delivered to your home or agreed address by a designated home delivery company. Your MS team can explain the options available locally.

What support will I receive when I start taking my DMD?

Before you start taking a DMD your MS team will explain how to take the drug, how to manage any side effects and who to contact if you have any problems. If you are starting an injectable treatment your MS nurse will show you how to do injections. Your MS team will also make regular appointments with you to check how you are doing on treatment.

How long do I need to be on treatment?

DMD treatment is a long term commitment measured in years, but you will be regularly reviewed by your MS team to see if the treatment is still effective for your MS. Your MS team will assess how you are managing any side effects and will check for complications.

Can I take a break from treatment?

It is not recommended that you take a break from treatment once you have started as keeping a steady level of drug in your body is important for it to work properly. There may be times when you or your MS team think taking a break might be appropriate, but you should discuss the potential benefits and risks of doing this with your MS team before you stop taking your drug.

Switching treatment

Is it possible to change which drug I take later on?

You may need to change drugs if you continue to experience relapses, if your brain scans show that your MS is still active or if you are experiencing persistent and unmanageable side effects.

What happens if I don't respond to treatment?

All of the DMDs take several months to start working to reduce the number of relapses you have. If after a period of time you experience the same number of relapses, or your relapses are as severe as, or worse than, before treatment or your brain scans show that your MS remains active, the drug might not be working for you. Your MS team may suggest changing (switching) to another DMD, most probably one that is more effective. This is known as escalating treatment.

What happens if my treatment stops working?

If, having been on treatment for a while with your MS well controlled, you then notice that things are changing, the treatment may have stopped working for you. You may have more relapses, there may be more changes on your brain scans or you might find that you are having more problems with walking or other symptoms. There are several reasons why this may happen. The body's natural defences can develop antibodies against some of the DMDs, reducing or 'neutralising' their effect. It might also be that the nature of your MS has changed. If you notice any changes, contact your MS team to discuss your options. They may suggest changing to another DMD.

Stopping treatment

Can I stop treatment?

If you do not feel the treatment is effective or you are struggling with side effects then you can stop treatment. This should only be done following discussion with your MS team because it can be dangerous to stop some DMDs suddenly. They may be able to suggest an alternative drug you may wish to try first before stopping treatment altogether.

Is it likely my MS will get worse if I stop treatment?

If you stop treatment there is a greater risk that you will have a relapse or inflammation around your nerves. As MS is unpredictable and everyone's experience is different, it is impossible to predict to what extent your MS may get worse if you stop treatment.

Could my MS team decide to stop my DMDs – if so why?

If your MS team conclude your treatment is no longer working or you develop serious complications from the drug then they may suggest you stop treatment. Even if the drug has been effective in the past, there may come a time when treatment is no longer effective or you are at too high a risk of the complications to continue. Alternatively the nature of your MS may have changed.

Some people initially diagnosed with relapsing remitting MS will develop secondary progressive MS meaning they have fewer or no relapses but have a gradual increase in disability. While you continue to have relapses or show evidence of MS activity on MRI scans, it may be appropriate for you to continue taking one of the DMDs. The progressive phase is thought to be caused by permanent loss of nerves rather than new inflammation, so the DMD drugs are not effective or useful in this stage.

Your team should discuss the reasons why treatment may need to be stopped, give advice on an appropriate time to do this and give you support throughout the process.

Other concerns

Any questions for my MS team.

5. Conception, pregnancy and breastfeeding

Conception

I'm a woman with MS, can I take DMDs while we try for a baby?

There are clear guidelines for the use of DMDs in pregnancy, based on the evidence we have for their effect on conception or the unborn child. As the DMDs vary in their effect and safety, you should discuss your own situation with your MS team to determine what course of action is best for you.

I'm a man with MS, can I take DMDs while we try for a baby?

There is limited information concerning the impact of DMDs on conception or the unborn child when the father is taking a DMD. The use of some DMDs by the father has been shown to have no adverse effect on the baby, other DMDs have been shown to temporarily affect sperm quality. If you are considering starting a family, you should discuss your situation with your MS team.

Pregnancy

Can I take DMDs during pregnancy?

Pregnant women are not included in clinical trials. The information we have about the safety of DMDs in pregnancy comes from pregnancy registers, which collect the outcomes of pregnancies where the mother has taken a DMD during part or all of her pregnancy. Some DMDs can be taken during pregnancy, if the benefits outweigh the risks to mother and child.

Some DMDs are not recommended at all during pregnancy. Stopping taking a DMD suddenly can cause problems. You should discuss any plans for pregnancy with your MS team, so you can plan how you will stop or change your MS treatment.

What should I do if I become pregnant while on treatment?

If you find yourself pregnant while taking a DMD you should contact your MS team to discuss whether or not to come off treatment.

Breastfeeding

Can I breastfeed if I am taking a DMD?

Some DMDs can be used during breastfeeding, and your MS team will support you if you wish to breastfeed your baby. There is an increased risk of having a relapse in the three months after childbirth, so you may wish to freeze supplies of your breastmilk if you decide to take one of the DMDs that is not recommended while breastfeeding. Discuss your preferences with your MS team.

MS Pregnancy Register

If you are pregnant and have MS, you are invited to join the UK MS Pregnancy Register. You will have the opportunity to share your experiences, choices and plans in a series of questionnaires, which will help to improve health care for women with MS and their babies. You can read more about the project here: ukmsregister.org/pregnancy

6. Disease modifying drugs

This chapter contains brief notes on each of the disease modifying drugs that are licensed for use for RRMS in the UK. You can find more information on each DMD on the MS Trust website. This includes the Patient Information Leaflet provided by the drug manufacturer and links to the clinical trial evidence used in the licensing of each DMD.

There are several ways to find this information:

- You can type the name of the DMD into the search box at the top of the homepage.
- You can look up the drug in the A-Z of MS.
- You can use the MS Decisions online tool to compare different DMDs.

For the most up-to-date information about the disease modifying drugs, check the web page for that drug, as this will include any changes since this book was printed.

First line or second line?

Neurologists across the UK follow clear guidelines in prescribing DMDs. They take into account how active your MS has been and what other drugs you are taking or have taken in the past.

Some DMDs may not be offered to you as a first option for treating your MS if the prescribing guidelines require you to try other options first. This is to reduce the risk of unnecessary side effects.

If you continue to have relapses while taking the first line option, or you have intolerable side effects, then your neurologist may suggest switching to a different DMD. This may be referred to as a second line option.

Within these prescribing guidelines, there may be flexibility. You can discuss with your neurologist how you feel about particular risks and side effects, and state your preferences.

Alternatives to DMDs

Stem cells are part of the body's normal repair system which replaces damaged or dying cells. A process called autologous haematopoietic stem cell transplantation (aHSCT) can be used to treat MS. It uses your own stem cells, which are collected and then injected back into your body after a course of strong chemotherapy. The hope is that the cells will rebuild your immune system without the tendency to attack your myelin.

A small number of centres provide aHSCT on the NHS under specific circumstances to a very limited number of people. People accepted for treatment generally either have a very aggressive type of MS or continue to have relapses even after trying one or more disease modifying drugs.

You can read more about aHSCT on our website mstrust.org.uk/a-z/stem-cells-and-ms-ahsct

Beta interferons (Avonex, Betaferon, Extavia, Plegridy, Rebif)	
How it is taken 	**Avonex:** You inject yourself into a muscle once a week. **Betaferon:** You inject yourself under the skin every other day. **Extavia:** You inject yourself under the skin every other day. **Plegridy:** You inject yourself under the skin or into a muscle once a fortnight. **Rebif:** You inject yourself under the skin three times a week.
Relapses 	Moderately effective: reduces the number of relapses you have by about 1/3. Any relapses you have should be less severe.
Lesions 	People taking beta interferons have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Taking beta interferons may slow down the build-up of MS disability.
Infection 	Beta interferons are not thought to affect your ability to deal with minor infections. Taking beta interferons does not put you at increased risk of severe disease with Covid-19.
Vaccines 	Beta interferons are not thought to affect the way your body reacts to vaccination. People taking beta interferons can have live and inactivated vaccines if medically necessary.
Pregnancy 	No evidence of safety concerns for mother or baby during pregnancy. Can be taken if medically necessary.
Breastfeeding 	Beta interferon drugs can be taken while breastfeeding.
Common, mild side effects	More than 1 in 100 people taking beta interferons notice mild to moderate side effects. These include flu-like symptoms, injection site reactions, headache, decrease in white blood cells, difficulty sleeping, diarrhoea, nausea and vomiting, hair loss.
Rare, serious side effects	Rare risk of liver problems, serious depression or serious allergic reactions.
Additional information	Avonex, Plegridy and Rebif must be stored in the fridge.

How do beta interferons work?

Beta interferon is the chemical in your body that signals the end of an immune response. There are five different DMDs based on beta interferon. They differ in how frequently you take them, how they should be injected and in the injector mechanism that they use.

Taking extra beta interferon in the form of one of these drugs calms inflammation throughout your body, which might otherwise damage your nerve cells.

Who can take beta interferons?

All of the beta interferon drugs can be prescribed for adults with active relapsing remitting MS.

Some of the beta interferons can be prescribed for people with secondary progressive MS who continue to have disabling relapses. Speak to your MS team for further information.

With the exception of Plegridy, the beta interferons can also be prescribed for people who have had a first episode of neurological symptoms (clinically isolated syndrome) and have a high risk of developing MS.

Animal studies and pregnancy registers have shown no safety concerns for pregnant women who are taking a beta interferon or their babies. Studies show that the drug is not detectable in breast milk and that babies who have been breastfed by women taking a beta interferon show no adverse effects.

It's important that you tell your MS team if you have any health problems or are taking other medicines. Beta interferons may not be suitable if you have severe depression or suicidal thoughts.

How do I take beta interferons?

Your MS nurse will show you how to do the injections, discuss the practicalities and offer advice and ongoing support if you should need it.

To give your body a chance to get used to the drug and reduce the impact of side effects, your doctor or MS nurse may suggest you start on a lower dose, increasing to a full dose over time.

What side effects could I get with beta interferons?

Serious side effects such as liver damage, allergic reactions and depression are rare with beta interferons, although mild to moderate side effects are common. Injection site reactions and flu-like symptoms, such as headaches, chills or muscle aches are more common when you first start taking a beta interferon, and they tend to subside over time.

Before starting a beta interferon, you should have blood tests to measure your blood cell counts and check your liver function.

Once you've started treatment, you'll have blood tests to measure blood cell counts and monitor liver function, generally every three months for the first year, then less frequently. Your team may check for the presence of neutralising antibodies that can reduce the treatment effect and recommend switching to another DMD if these are found.

Copaxone and Brabio (glatiramer acetate)

How it is taken 	You inject yourself under the skin either daily or three times a week depending on your dose.
Relapses 	Moderately effective: reduces the number of relapses you have by about 1/3. Any relapses you have should be less severe.
Lesions 	People taking Copaxone or Brabio have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Taking Copaxone or Brabio may slow down the build-up of MS disability.
Infection 	Copaxone and Brabio are not thought to affect your ability to deal with minor infections. Taking them does not increase your risk of developing severe Covid-19.
Vaccines 	Copaxone and Brabio are not thought to affect the way your body reacts to vaccination. People taking them can have live and inactivated vaccines if medically necessary.
Pregnancy 	No evidence of safety concerns for mother or baby during pregnancy. Copaxone is licenced for use in pregnancy.
Breastfeeding 	Copaxone and Brabio can be taken while breastfeeding.
Common, mild side effects	More than 1 in 100 people notice mild to moderate side effects when taking Copaxone or Brabio. These include injection site reactions such as redness, swelling, itching or pain, indentations in the skin, headache, depression, anxiety, nausea, feeling weak, chest pain, swollen lymph nodes or gastrointestinal issues.
Rare, serious side effects	Rare risk of immediate post-injection reaction.
Additional information	Copaxone and Brabio must be stored in the fridge.

How do Copaxone and Brabio work?

Copaxone and Brabio are chemically similar. They are a synthetic combination of four amino acids, resembling the myelin protein that surrounds your nerve fibres. This is thought to act as a chemical decoy which diverts an immune attack away from your myelin.

Who can take Copaxone or Brabio?

Both drugs can be prescribed for adults with active relapsing remitting MS.

Copaxone is licenced for use in pregnancy, and Brabio may also be taken if medically necessary. Copaxone and Brabio cannot be detected in the breast milk of women taking them, which means that they may be taken while breastfeeding if medically necessary.

How do I take Copaxone or Brabio?

You take Copaxone or Brabio by injecting yourself under your skin. Two dose options are available for each drug: one for daily injections and another for injections three times a week. The drugs are supplied in single-use, pre-filled syringes.

Your MS nurse will show you how to do the injections, discuss the practicalities and offer advice and ongoing support if you should need it.

You will not normally need to have blood tests before starting your treatment, or routine tests while you are taking Copaxone or Brabio.

What side effects could I get with Copaxone or Brabio?

People taking Copaxone or Brabio sometimes report redness, swelling, pain or permanent indentations (lipoatrophy) at the injection site.

Occasionally, some people may experience a reaction, known as the immediate post-injection reaction (IPIR), shortly after injection. This may cause flushing, chest tightness, shortness of breath and palpitations. This reaction can last 15-30 minutes, will ease without any treatment and doesn't cause long-term problems. If symptoms last longer than 30 minutes, contact your doctor immediately or go straight to the A&E department of your nearest hospital.

Aubagio (teriflunomide)	
How it is taken 	You take one pill per day.
Relapses 	Moderately effective: reduces the number of relapses you have by about 1/3. Any relapses you have should be less severe.
Lesions 	People taking Aubagio have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Aubagio may slow down the build-up of MS disability.
Infection 	Aubagio may affect your ability to deal with minor infections. Taking it does not increase your risk of developing severe Covid-19.
Vaccines 	Aubagio is not thought to affect the effectiveness of vaccines, although you may be advised to not take live vaccines. Inactivated vaccines can be taken if medically necessary, including flu, Covid-19 vaccines and boosters.
Pregnancy 	Aubagio must not be taken during pregnancy.
Breastfeeding 	You should not breastfeed while taking Aubagio.
Common, mild side effects	More than 1 in 100 people notice mild to moderate side effects when taking Aubagio. These include headache, nausea, diarrhoea, hair loss or thinning, infections, anxiety, pain, a rash, mild allergic reaction.
Rare, serious side effects	Up to 1 in 100 people taking Aubagio develop peripheral neuropathy or a decrease in blood platelets (thrombocytopenia). There is a rare but serious risk of liver damage.
Additional information	Aubagio contains lactose.

How does Aubagio work?

Aubagio destroys certain types of active immune cells. This results in lower numbers of them circulating in your body and damaging your nerve cells.

Who can take Aubagio?

Aubagio can be prescribed for adults and children with active relapsing remitting MS.

If your MS is very active you will not be offered Aubagio. Very active MS means that you continue to have relapses even though you have been taking another DMD, or that you have had two or more severe or disabling relapses in the previous year and show areas of new damage on two consecutive MRI scans.

Based on data in animal studies, there is an increased risk of having a baby with birth defects if Aubagio is taken during pregnancy. Aubagio remains in the blood for a long time after stopping treatment, so this risk may continue for up to two years. Aubagio passes into breast milk, so should not be taken while breastfeeding.

You must not become pregnant while taking Aubagio. Women of childbearing age must use an effective method of contraception during treatment and for two years after stopping Aubagio. Aubagio may also be passed to a woman via semen.

Women who suspect that they are pregnant while taking Aubagio, or in the two years after stopping treatment, should contact their GP immediately for a pregnancy test. If the test is positive, the levels of Aubagio in your blood can be reduced rapidly to safe levels by taking certain medicines (cholestyramine or activated charcoal).

Aubagio may not be appropriate if you have existing medical conditions including: severe liver problems, serious problems affecting the immune system (eg HIV/Aids) and problems affecting your bone marrow or reduced blood cell counts (eg anaemia, leucopenia, neutropenia or thrombocytopenia).

How do I take Aubagio?

You take Aubagio as a daily pill. Before starting Aubagio, you should have tests to measure your blood pressure, blood cell counts and check your liver function. You may also be offered a pregnancy test, if relevant.

Once you've started treatment, you'll have regular tests to monitor your liver function, blood pressure and blood cell counts. These are generally every month for the first six months and every four months thereafter.

What side effects could I get with Aubagio?

You may feel sick, have diarrhoea or thinning hair when you first start taking Aubagio but these side effects generally improve in the following months. A small number of people taking Aubagio develop peripheral neuropathy (tingling, pain or numbness in your hands and feet) or a low blood platelet count. A low platelet count could make you more at risk of bleeding.

Tecfidera (dimethyl fumarate)	
How it is taken 	You take one pill twice a day, with food.
Relapses 	More effective: reduces the number of relapses you have by about 1/2. Any relapses you have should be less severe.
Lesions 	People taking Tecfidera have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Tecfidera may slow down the build-up of MS disability.
Infection 	Tecfidera is not thought to affect your ability to deal with minor infections. Taking it does not increase your risk of developing severe Covid-19.
Vaccines 	Tecfidera is not thought to affect the way your body reacts to vaccination. People taking Tecfidera can have live and inactivated vaccines if medically necessary.
Pregnancy 	Tecfidera is not recommended during pregnancy.
Breastfeeding 	Breastfeeding is not usually recommended while taking Tecfidera but may be appropriate in some circumstances.
Common, mild side effects	More than 1 in 100 people notice mild or moderate side effects when taking Tecfidera. These include flushing and feeling hot, feeling sick, diarrhoea, abdominal pain, vomiting, indigestion, decrease in white blood cells, a rash or increased levels of liver enzymes.
Rare, serious side effects	Less than 1 in 10,000 people taking Tecfidera have developed PML (see notes). This can be fatal, but your risk is monitored closely as part of your treatment.
Additional information	Capsule contains beef gelatin.

How does Tecfidera work?

Tecfidera is thought to reduce the inflammation caused when the immune system attacks your myelin. It may also protect your nerve cells from damage caused by chemicals released during the immune attack.

Who can take Tecfidera?

In England, Wales and Northern Ireland, Tecfidera can be prescribed for adults with active relapsing remitting MS. In Scotland, Tecfidera is approved for adults with relapsing remitting MS.

If your MS is very active you will not be offered Tecfidera. Very active MS means that you continue to have relapses even though you have been taking another DMD, or that you have had two or more severe or disabling relapses in the previous year and show areas of new damage on two consecutive MRI scans.

Tecfidera is not recommended during pregnancy. If you are thinking about becoming pregnant, talk to your MS nurse or neurologist about whether you should continue to take Tecfidera until you are pregnant and during your pregnancy. If you become pregnant while on Tecfidera, your neurologist or MS nurse may recommend you stop taking it.

How do I take Tecfidera?

You take Tecfidera as a pill, twice daily. To give your body a chance to get used to the drug and reduce the impact of side effects, you start on a low dose for the first week, increasing to the full dose in the second week.

Before starting Tecfidera, you should have blood and urine tests to measure your blood cell counts and to check your liver and kidney function. It is also important that you have had an MRI scan in the last three months.

Once you've started treatment, you'll have tests every three to six months to monitor your blood cell counts and liver and kidney function.

What side effects could I get with Tecfidera?

You may experience hot flushes and gastrointestinal upset when you first start taking Tecfidera (mostly during the first month). Most people have mild to moderate side effects which tend to go away over time.

Your neurologist or MS nurse may suggest ways to reduce these side effects including reducing the dose temporarily, taking aspirin before each dose to prevent flushing or taking doses on a full stomach to reduce gastrointestinal upset.

Cases of dangerous brain infection (progressive multifocal leukoencephalopathy, or PML) have been reported for people taking Tecfidera. PML is usually associated with prolonged low levels of certain white blood cells (lymphocytes) and your MS team may recommend you stop Tecfidera if this occurs. The risk of developing PML on Tecfidera is considered very low but if you are worried discuss your concerns with your MS team.

Some serious infections with herpes zoster virus (shingles) have been reported for people taking Tecfidera.

Vumerity (diroximel fumarate)	
How it is taken 	You take two pills twice daily.
Relapses 	More effective: reduces the number of relapses you have by about 1/2. Any relapses you have should be less severe.
Lesions 	People taking Vumerity have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Vumerity may slow down the build-up of MS disability.
Infection 	Vumerity is not thought to affect your ability to deal with minor infections. Taking it does not increase your risk of developing severe Covid-19.
Vaccines 	Vumerity is not thought to affect the effectiveness or safety of vaccines. Live and inactivated vaccines can be taken if medically necessary.
Pregnancy 	Vumerity is not recommended during pregnancy.
Breastfeeding 	Breastfeeding is not recommended while taking Vumerity.
Common, mild side effects	More than 1 in 100 people notice mild or moderate side effects when taking Vumerity. These include flushing and feeling hot, nausea, diarrhoea, abdominal pain, vomiting, indigestion, a decrease in white blood cells (lymphopenia), a rash, increased levels of liver enzymes, or the presence of ketones and protein in urine.
Rare, serious side effects	Less than 1 in 10,000 people taking Tecfidera, a similar drug, have developed PML (see notes). This can be fatal, but your risk is monitored closely as part of your treatment.
Additional information	

How does Vumerity work?

Vumerity works in a similar way to Tecfidera, by reducing the inflammation caused when the immune system attacks your myelin. It may also protect your nerve cells from damage caused by chemicals released during the immune attack.

Who can take Vumerity?

Vumerity can be prescribed for people with active relapsing remitting MS.

There is currently very little data on the safety of Vumerity during pregnancy. If you are considering pregnancy, talk to your MS nurse or neurologist about whether you should continue to take Vumerity until you conceive and during your pregnancy.

If you become pregnant while on Vumerity, your neurologist or MS nurse may recommend you stop taking it.

How do I take Vumerity?

You take Vumerity as a pill, twice daily. You can take it with food or not, as you prefer. In clinical trials, fewer people taking Vumerity reported stomach upsets than has been seen with Tecfidera. If you do have flushing or stomach problems, taking it with food may help.

For your first week of treatment, you will take just one pill per day to help manage the side effects.

Before starting Vumerity, you should have tests to measure your blood cell counts and to check your liver and kidney function. It is also important that you have had an MRI scan within three months.

Once you've started treatment, you'll have tests every three to six months. These tests monitor your blood cell counts and liver and kidney function.

What side effects could I get with Vumerity?

You may experience hot flushes when you first start taking Vumerity (mostly during the first month). Most people have mild to moderate side effects which tend to go away over time.

Because Vumerity is similar to Tecfidera, there is a potential risk of progressive multifocal leukoencephalopathy (PML), a rare and dangerous brain infection. The risk of developing PML on Vumerity is considered very low but if you are worried discuss your concerns with your MS team.

Some serious infections with herpes zoster virus (shingles) have been reported for people taking Tecfidera. This could be a risk for people taking Vumerity as well.

Gilenya (fingolimod)	
How it is taken 	You take one pill per day.
Relapses 	More effective: reduces the number of relapses you have by about 1/2. Any relapses you have should be less severe.
Lesions 	People taking Gilenya have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Gilenya may slow down the build-up of MS disability.
Infection 	Taking Gilenya may affect your ability to deal with infections. Taking Gilenya is unlikely to increase the risk of severe Covid-19 infection.
Vaccines 	Ensure your vaccinations are complete before taking Gilenya. You may not make a full immune response to a new vaccine. You should not have live vaccines while taking Gilenya, but non-live vaccines (such as those for flu or Covid-19) are safe to take.
Pregnancy 	You must not become pregnant while taking Gilenya.
Breastfeeding 	You should not breastfeed while taking Gilenya.
Common, mild side effects	More than 1 in 100 people notice side effects such as a cough, headache, back pain, diarrhoea or increased risk of infections including flu. Up to 1 in 100 people taking Gilenya may experience increased liver enzyme levels, a decrease in white blood cells or low mood.
Rare, serious side effects	Gilenya may cause macular oedema (affecting less than 1 in 100 people), a swelling in the back of the eye which can affect vision. Less than 1 person in 10,000 taking Gilenya have developed PML (see notes).
Additional information	Capsule contains beef gelatin. Increased risk of some skin cancers. You should limit your exposure to sunlight (UV) by wearing protective clothing and applying high-protective sunscreen in the sun.

How does Gilenya work?

Gilenya binds to the surface of white blood cells (lymphocytes), trapping them in the lymph glands, and preventing them from crossing into the central nervous system and causing inflammation and damage.

Who can take Gilenya?

Gilenya can be prescribed to adults and children with active relapsing remitting MS. Gilenya can also be prescribed if you have very active MS (two or more disabling relapses in one year and evidence of new areas of MS activity).

You should not start Gilenya if you have a lowered immune response, have a severe infection such as hepatitis or tuberculosis, have active cancer (except for some types of skin cancer) or severe liver problems.

If you have heart problems, liver disease or a condition affecting your eyes, you may need additional medical assessment before Gilenya is prescribed and may need additional monitoring during treatment.

You must not become pregnant or breastfeed while taking Gilenya. It takes two months from stopping taking Gilenya before it is safe to become pregnant. If you do become pregnant while taking Gilenya you should contact your MS team.

How do I take Gilenya?

You take Gilenya as a pill, once daily. The first dose is taken in a hospital or clinic under medical supervision as Gilenya can cause temporary changes in heart rate, heartbeat, and blood pressure. These symptoms are monitored for six hours.

Unless there are problems, further doses of Gilenya are taken at home.

Before starting Gilenya, your blood pressure and pulse will be measured. You should have tests to measure your blood cell counts, check your liver function and check for immunity to the virus that causes chickenpox. You should have had an MRI scan within three months before starting treatment and a pregnancy test if relevant.

Your doctor should check your skin for any sores, lumps or damaged areas that may be a sign of cancer. If you have a pre-existing health condition which affects the eyes, such as diabetes, you may also have an eye examination.

Once you've started treatment, you'll have tests to measure blood cell counts and monitor liver function and your blood pressure will be measured. You should check your skin regularly for any changes and tell your MS team or GP.

After about three to four months of starting treatment an eye test may be recommended to monitor for macular oedema.

What side effects could I get with Gilenya?

More than 1 person in 100 notices mild to moderate side effects when taking Gilenya.

There are some rare but potentially serious side effects, including PML and macular oedema. PML (progressive multifocal leukoencephalopathy) is a rare and dangerous brain infection. The risk of developing PML while taking Gilenya is low, but your risk is monitored closely as part of your treatment plan.

Cases of basal cell carcinoma, a kind of skin cancer, have been reported in people taking Gilenya. Basal cell carcinoma is a slow-growing skin cancer that almost never spreads to other parts of the body or becomes life-threatening but can be disfiguring if not treated promptly.

Ponvory (ponesimod)	
How it is taken 	You take one pill per day.
Relapses 	More effective: reduces the number of relapses you have by about 1/2. Any relapses you have should be less severe.
Lesions 	People taking Ponvory have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Ponvory may slow down the build-up of MS disability.
Infection 	Taking Ponvory may affect your ability to deal with infections. Taking Ponvory is unlikely to increase the risk of severe Covid-19 infection.
Vaccines 	Ponvory. Ensure your vaccinations are complete before taking Ponvory. You may not make a full immune response to a new vaccine. You should not have live vaccines while taking Ponvory, but non-live vaccines (such as those for flu or Covid-19) are safe to take.
Pregnancy 	You must not become pregnant while taking Ponvory.
Breastfeeding 	You should not breastfeed while taking Ponvory.
Common, mild side effects	More than 1 in 100 people notice side effects such as coughs, colds, shingles, urinary tract and chest infections. Up to 1 in 100 people taking Ponvory may experience increased liver enzyme levels, a decrease in white blood cells or low mood.
Rare, serious side effects	Less than 1 in 100 people taking Ponvory may notice a slow heart rate or increased risk of skin cancer. Ponvory may cause macular oedema (see notes).
Additional information	Theoretical increase in skin cancer risk. Protect your skin in the sun.

How does Ponvory work?

Ponvory binds to the surface of white blood cells (lymphocytes), trapping them in the lymph glands, and preventing them from crossing into the central nervous system and causing inflammation and damage.

Who can take Ponvory?

Ponvory can be prescribed to adults with active relapsing remitting MS.

You should not start Ponvory if you have a lowered immune response, have a severe infection such as hepatitis or tuberculosis or have active cancer. If you have heart problems, liver disease or a condition affecting your eyes, you may need additional medical assessment before Ponvory is prescribed and may need additional monitoring during treatment.

You must not become pregnant or breastfeed while taking Ponvory, as there may be an increased risk of birth defects, because of the way the drug works. It takes one week from stopping taking Ponvory before it is safe to become pregnant, and you should use effective contraception before that. If you do become pregnant while taking Ponvory you should contact your MS team.

How do I take Ponvory?

You take Ponvory as a pill, once daily. To give your body time to get used to the drug and reduce the impact of side effects, you start on a low dose for the first 14 days, gradually increasing to the full dose on day 15.

Before starting Ponvory, your blood pressure and pulse will be measured. Your heart will be checked with an electrocardiogram (ECG). You should have tests to measure your blood cell counts, check your liver function and check for immunity to the virus that causes chickenpox. You should have a pregnancy test before starting Ponvory, if relevant.

Once you've started treatment, you'll have tests to measure blood cell counts and monitor liver function and your blood pressure will be measured. Once a year, your doctor should check your skin for any sores, lumps or damaged areas that may be a sign of cancer.

After about three-four months of starting treatment an eye test may be recommended to monitor for macular oedema.

What side effects could I get with Ponvory?

More than 1 in 100 people notices mild to moderate side effects when taking Ponvory. These include coughs and colds, chest infections, increased levels of liver enzymes, macular oedema, (a swelling at the back of the eye) urinary tract infections and shingles.

There is a theoretical risk of developing PML (progressive multifocal leukoencephalopathy, a rare, serious brain infection) while taking Ponvory, but no cases have yet been seen. Less than 1 in 100 people taking Ponvory noticed a slow heart rate, shortness of breath or developed skin cancer.

There is a theoretical increased risk of skin cancer with Ponvory. You should limit your exposure to sunlight and UV light by wearing protective clothing and applying sunscreen in the sun.

Zeposia (ozanimod)	
How it is taken 	You take one pill per day.
Relapses 	More effective: reduces the number of relapses you have by about 1/2. Any relapses you have should be less severe.
Lesions 	People taking Zeposia have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Zeposia may slow down the build-up of MS disability.
Infection 	Taking Zeposia may affect your ability to deal with infections. Taking Zeposia is unlikely to increase the risk of severe Covid-19 infection.
Vaccines 	Ensure your vaccinations are complete before taking Zeposia. You should not have live vaccines while taking Zeposia, but non-live vaccines (such as those for flu or Covid-19) are safe to take.
Pregnancy 	You must not become pregnant while taking Zeposia, or for three months after stopping.
Breastfeeding 	You should not breastfeed while taking Zeposia.
Common, mild side effects	More than 1 in 100 people notice side effects such as coughs, colds, urinary tract and chest infections, a decrease in white blood cells or a slow heart rate.
Rare, serious side effects	Less than 1 in 100 people taking Zeposia may develop shingles, macular oedema or posterior reversible encephalopathy syndrome (see notes). Zeposia may increase your risk of skin cancer.
Additional information	Theoretical increase in skin cancer risk. Protect your skin in the sun.

How does Zeposia work?

Zeposia binds to the surface of white blood cells (lymphocytes), trapping them in the lymph glands, and preventing them from crossing into the central nervous system and causing inflammation and damage.

Who can take Zeposia?

Zeposia can be prescribed to adults with active relapsing remitting MS in Scotland.

You should not start Zeposia if you have a lowered immune response, have a severe infection such as hepatitis or tuberculosis or have active cancer. If you have heart problems, liver disease or a condition affecting your eyes, you may need additional medical assessment before Zeposia is prescribed and may need additional monitoring during treatment.

There is little data on Zeposia in pregnancy. Based on the way the drug works, you should not become pregnant or breastfeed while taking Zeposia as there could be an increased risk to your baby. You should use effective contraception while taking Zeposia and for three months after stopping. If you do become pregnant while taking Zeposia you should contact your MS team.

How do I take Zeposia?

You take Zeposia as a pill, once daily. To give your body time to get used to the drug and reduce the impact of side effects, you start on a low dose for the first seven days, gradually increasing to the full dose on day eight.

Before starting Zeposia, your blood pressure and pulse will be measured. Your heart will be checked with an electrocardiogram (ECG). You should have tests to measure your blood cell counts and check your liver function. You should have a pregnancy test before starting Zeposia, if relevant.

Once you've started treatment, you'll have regular blood tests and your blood pressure will be measured. Once a year, your doctor should check your skin for any sores, lumps or damaged areas that may be a sign of cancer. After about three to four months of starting treatment an eye test may be recommended to monitor for macular oedema.

What side effects could I get with Zeposia?

More than 1 in 100 people notice mild to moderate side effects when taking Zeposia. These include coughs and colds, urinary tract and chest infections, increased levels of liver enzymes, macular oedema, (a swelling at the back of the eye) a slow heart rate and shingles.

There is a theoretical risk of developing PML (progressive multifocal leukoencephalopathys, a rare, serious brain infection) while taking Zeposia, but no cases have yet been seen. Zeposia may increase your risk of skin cancer. You should limit your exposure to sunlight and UV light by wearing protective clothing and applying sunscreen in the sun. There is a rare risk of developing posterior reversible encephalopathy syndrome (PRES) which consists of a severe headache, confusion, seizures and loss of vision.

Mavenclad (cladribine)	
How it is taken 	You take Mavenclad as two short courses of pills, 12 months apart.
Relapses 	More effective: reduces the number of relapses you have by about 1/2 to 2/3. Any relapses you have should be less severe.
Lesions 	People taking Mavenclad have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Mavenclad may slow down the build-up of MS disability.
Infection 	Taking Mavenclad may affect your ability to deal with infections. You may need to take extra precautions against infection for three months after each treatment course.
Vaccines 	You should ensure your vaccinations are complete before taking Mavenclad. You should not have live vaccines while taking Mavenclad but inactivated vaccines (such as flu or Covid-19) can be taken.
Pregnancy 	You must not become pregnant while taking Mavenclad or for six months afterwards.
Breastfeeding 	You should not breastfeed while taking Mavenclad.
Common, mild side effects	More than 1 in 100 people notices mild to moderate side effects when taking Mavenclad. These include a decrease in white blood cells (lymphopenia), herpes virus infection (shingles or cold sores), rash or hair thinning.
Rare, serious side effects	Up to 1 in 1000 people taking Mavenclad may develop liver injury, usually in the first eight weeks after beginning treatment.
Additional information	No treatment is normally required during year three and four after starting to take Mavenclad.

How does Mavenclad work?

Mavenclad works by gradually destroying certain types of white blood cell involved in the damage associated with MS.

Who can take Mavenclad?

Mavenclad can be prescribed if you are still having relapses after taking another DMD for at least one year. Mavenclad can also be prescribed if you have very active MS (two or more disabling relapses in one year and evidence of new areas of MS activity).

Mavenclad may not be appropriate if you have existing medical conditions including liver or kidney problems, active cancer, serious infections such as HIV or tuberculosis or are taking other medicines which suppress the immune system (including methotrexate, ciclosporin, cyclophosphamide and azathioprine).

Mavenclad should not be used by men or women while attempting to conceive, or by people who are currently pregnant. In men it could affect the development and quality of your sperm for up to six months after treatment, and in women it could seriously harm your developing baby.

Both men and women should use effective contraception for six months after taking Mavenclad to prevent pregnancy. If you or your partner become pregnant within six months of your taking Mavenclad contact your neurologist or MS nurse as soon as possible.

If you become pregnant in the period between six months after your first course and when your second course is due, you will need to discuss delaying your second course.

How do I take Mavenclad?

You take Mavenclad as a pill in two treatment courses, 12 months apart:

- in the first course you take Mavenclad pills for up to five consecutive days in the first month and for up to five consecutive days in the second month
- the second course is taken 12 months later; you take Mavenclad pills for up to five consecutive days in the first month and for up to five consecutive days in the second month.

The actual number of tablets you take will depend on your weight.

People who took part in the clinical trials did not need further treatment with Mavenclad in years three and four. Ongoing studies are monitoring whether there is a need for further treatment in later years.

Before starting a Mavenclad treatment course you will have tests to check for liver problems, tuberculosis, HIV and hepatitis. Your white blood cell levels will also be checked. If necessary, you may be vaccinated against shingles or have a pregnancy test.

Once you've started treatment you'll have tests to monitor white blood cell levels at three and seven months in year one, before you start treatment in year two and again at three and seven months in year two. No additional monitoring is required in years three and four.

What side effects could I get with Mavenclad?

People taking Mavenclad may experience a rash or hair thinning, or be more likely to develop shingles or cold sores.

A very small number of people taking Mavenclad have developed liver injury. Your MS team will monitor your liver health via regular tests and you should report any symptoms of jaundice, abdominal pain, weight loss or vomiting.

Kesimpta (ofatumumab)	
How it is taken 	You self-inject Kesimpta under your skin once a month.
Relapses 	Highly effective: reduces the number of relapses you have by about 2/3. Any relapses you have should be less severe.
Lesions 	People taking Kesimpta have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Kesimpta may slow down the build-up of MS disability.
Infection 	Taking Kesimpta may affect your ability to deal with infections.
Vaccines 	You should ensure your vaccinations are complete before taking Kesimpta. You may not make a full immune response to a new vaccine. You should not have live vaccines while taking Kesimpta but inactivated vaccines (such as flu or Covid-19) can be taken.
Pregnancy 	Pregnancy is not recommended while taking Kesimpta.
Breastfeeding 	Kesimpta is licenced to be taken while breastfeeding.
Common, mild side effects	More than 1 in 100 people taking Kesimpta notice mild to moderate side effects, These include redness, pain, itching or swelling at the injection site, fever or chills, headache, muscle pain or tiredness. People taking Kesimpta are at increased risk of infection, including chest infections and colds, urinary tract infections and cold sores.
Rare, serious side effects	More evidence about longer term side effects will become known in the next three to five years.
Additional information	

How does Kesimpta work?

Kesimpta binds to and destroys B cells, a type of white blood cell which is involved when the immune system attacks the myelin surrounding nerve cells.

Who can take Kesimpta?

Kesimpta can be prescribed for adults with active relapsing remitting MS and very active relapsing remitting MS.

Kesimpta may not be appropriate if you have existing medical conditions including cancer, a serious infection such as hepatitis B, severe problems with your immune system or are taking other medicines which suppress the immune system.

Pregnancy is not recommended during treatment with Kesimpta. If you plan to start a family discuss your specific circumstances with your MS team. Women of child-bearing age must use an effective method of contraception during treatment and for six months after stopping Kesimpta.

If you become pregnant while taking Kesimpta, contact your neurologist or MS nurse. This is because Kesimpta can reduce the number of immune cells in both the mother and unborn baby if taken during pregnancy.

How do I take Kesimpta?

You self-inject Kesimpta under the skin (subcutaneous) once a month. Kesimpta is supplied as a ready-filled automatic injection pen.

You start treatment with one dose per week for the first three weeks (week 0, week 1 and week 2) and then you skip a week (week 3). After that you move on to one dose per month starting at week 4.

Your MS nurse will show you how to do the injections, discuss the practicalities and offer advice and ongoing support if you should need it.

There is no need for routine tests during treatment with Kesimpta, but your MS team will arrange appointments to check how you are coping and may suggest tests to check antibodies in your blood.

What side effects could I get with Kesimpta?

Most people treated with Kesimpta experience injection-site reactions or injection-related reactions such as tiredness. These are generally mild to moderate and clear-up the same or following day. They are mostly associated with the first injection and less frequent with subsequent injections.

Kesimpta suppresses part of the immune system so you will be more vulnerable to infections such as colds and viruses. Your MS team should give advice on ways to minimise the risk of infections.

Before starting Kesimpta, you will have tests to check for hepatitis B. Your white blood cell levels may also be checked.

Your doctor will check if you need any vaccinations before you start treatment with Kesimpta. If you need a live or live-attenuated vaccine it should be given at least four weeks before you start Kesimpta. Other types of vaccines should be given at least two weeks before you start Kesimpta.

Ocrevus (ocrelizumab)	
How it is taken 	You take Ocrevus via an intravenous infusion (drip) once every six months in a hospital clinic.
Relapses 	Highly effective: reduces the number of relapses you have by about 2/3. Any relapses you have should be less severe.
Lesions 	People taking Ocrevus have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Ocrevus may slow down the build-up of MS disability.
Infection 	Taking Ocrevus may affect your ability to deal with infections. Taking Ocrevus may increase your risk of severe disease with Covid-19.
Vaccines 	You should ensure your vaccinations are complete before taking Ocrevus. Once you have started treatment, you may not make a full immune response to a new vaccine. You should not have live vaccines while taking Ocrevus, but non-live vaccines (such as those for flu or Covid-19) are safe to take.
Pregnancy 	Not usually recommended during pregnancy, but your MS team may discuss taking it where the benefits outweigh the risks to mother and baby.
Breastfeeding 	Breastfeeding is not usually recommended while taking Ocrevus but may be appropriate in some circumstances.
Common, mild side effects	More than 1 in 10 people taking Ocrevus notice mild to moderate side effects. These include infusion reactions and infections affecting the respiratory tract, sinuses, stomach, bowel and skin. People taking Ocrevus are more at risk of flu and viral infections, cold sores and shingles.
Rare, serious side effects	A handful of cases of PML (a serious brain infection) have been seen in people taking Ocrevus. Most of these people had previously taken other DMDs first.
Additional information	

How does Ocrevus work?

Ocrevus binds to and destroys B cells, a type of white blood cell which is involved when the immune system attacks the myelin surrounding nerve cells.

Who can take Ocrevus?

Ocrevus can be prescribed for adults with active relapsing remitting MS and for very active relapsing remitting MS, providing they are unable or unwilling to take Lemtrada.

Ocrevus may not be appropriate if you have existing medical conditions including cancer or serious infections such as HIV or hepatitis B. Ocrevus may not be appropriate if you are taking other medicines which suppress the immune system (including methotrexate, ciclosporin, cyclophosphamide and azathioprine).

Ocrevus is not usually used during pregnancy. Women of childbearing age should use effective contraception during treatment. Discuss with your neurologist how long to leave after an infusion before attempting to become pregnant.

If you are planning to conceive or become pregnant while taking Ocrevus, tell your MS team immediately. You can then discuss whether staying on Ocrevus is appropriate in your situation.

How do I take Ocrevus?

You take Ocrevus via an intravenous infusion (a small tube placed in a vein, with the treatment infused via a pump) in a hospital infusion clinic. The first dose is given as two separate infusions, two weeks apart. Further doses are given as one infusion every six months, taking around three to four hours.

Before starting Ocrevus you will have tests to check for HIV and hepatitis B. Your white blood cell levels will also be checked.

Ocrevus can lower blood pressure. If you are taking medicine for high blood pressure, your doctor may ask you to stop taking it for 12 hours before each infusion.

Before you are given Ocrevus, you will receive a corticosteroid and an antihistamine before each infusion and you may also receive medication to reduce fever.

You will be closely monitored while you are being given Ocrevus and for at least one hour after the infusion has been given. This is in case you have any infusion-related reactions such as a rash or itchy skin, fever, headache, nausea, throat pain or dizziness.

The infusion may be slowed, temporarily stopped or permanently stopped if you have an infusion-related reaction, depending on how serious it is.

What side effects can I get with Ocrevus?

Many people taking Ocrevus notice respiratory infections and infusion reactions. These are generally mild to moderate and go away with time, but you will be monitored closely during the infusion.

Ocrevus can cause a decrease in blood proteins (immunoglobulins) that help protect you against infections.

Tysabri (natalizumab)

How it is taken 	You can take Tysabri via an intravenous infusion (drip) in a hospital clinic once every four, six or eight weeks. You can also take Tysabri as an injection under the skin, given by a health professional once every four or six weeks.
Relapses 	Highly effective: reduces the number of relapses you have by about 2/3. Any relapses you have should be less severe.
Lesions 	People taking Tysabri have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Tysabri may slow down the build-up of MS disability.
Infection 	Taking Tysabri does not affect your ability to deal with infections. Your risk of severe disease if you catch Covid-19 is not changed.
Vaccines 	Tysabri is not thought to affect the effectiveness or safety of vaccines. You can take live and inactivated vaccines, including those for flu and Covid-19 if medically necessary.
Pregnancy 	Not recommended during pregnancy, but your MS team may discuss taking it where the benefits outweigh the risks to mother and baby.
Breastfeeding 	Tysabri is not recommended during breastfeeding. However, you and your MS team should discuss your options carefully if you are at high risk of relapse.
Common, mild side effects	More than 1 in 10 people taking Tysabri notice mild to moderate side effects after an infusion or injection. These include, headache, dizziness, tiredness, nausea, an itchy rash and infections. Up to 1 in 100 people taking Tysabri may notice easy bruising, or develop a low blood platelet count.
Rare, serious side effects	Serious side effects with Tysabri can affect up to 1 in 100 people. They include liver damage, herpes infections of the eye and progressive multifocal leukoencephalopathy (PML).
Additional information	

How does Tysabri work?

Tysabri binds to immune cells in your blood stream, preventing them from passing through blood vessel walls and into your brain and spinal cord where they can damage your nerves.

Who can take Tysabri?

Tysabri can be prescribed if you have very active relapsing remitting MS, which is defined as two or more relapses in one year, with signs of increasing or new lesions between two consecutive MRI scans.

Your neurologist will need to know if you have previously taken other drugs which suppress the immune system (for example mitoxantrone, azathioprine, cyclophosphamide or methotrexate).

Taking Tysabri during pregnancy and breastfeeding is not normally recommended. Evidence from pregnancy registers showed no difference between the health of babies born to women who stopped taking Tysabri before they became pregnant and babies whose mothers continued to take Tysabri during the early months of their pregnancy.

You may be at risk of a relapse if you stop taking Tysabri during pregnancy.

If you are planning a pregnancy, your MS team may recommend remaining on Tysabri until conception, and during pregnancy based on how active your MS has been and the risk that you might have a significant relapse. Where Tysabri is continued throughout pregnancy, your MS team may discuss timing the doses to best balance safety for you and your baby.

How do I take Tysabri?

You can take Tysabri via an infusion (drip) or as an injection given by a health professional in hospital. The injection is quicker, but is as effective as the infusion, and you will be monitored just as carefully throughout treatment.

Before starting treatment with Tysabri, you will have tests to check your blood cell counts and check your liver and kidney function. You should also have had an MRI scan within three months.

Before and during each infusion or injection, your blood pressure, temperature and pulse rate will be checked. You will be monitored to check for any serious allergic reaction.

Stopping Tysabri suddenly can cause a serious inflammatory disorder that can be dangerous.

What side effects could I get with Tysabri?

People taking Tysabri may notice infusion related reactions after each treatment. These include dizziness, nausea and a rash. You may also be at increased risk of infections including progressive multifocal leukoencephalopathy (PML).

PML occurs when a virus infection in the brain (JC virus) is able to develop. This can happen when you take drugs that suppress your immune system, such as Tysabri. If you have JC virus in your blood, your PML risk is increased the longer you take Tysabri, and especially if you have previously had treatment with other immunosuppressive drugs such as azathioprine, cyclophosphamide, mitoxantrone or methotrexate.

PML is serious and can be fatal, but your MS team will explain what early symptoms to look out for, and will monitor your risk by giving regular blood tests for the JC virus and regular MRI tests.

Lemtrada (alemtuzumab)	
How it is taken 	You take Lemtrada as two courses via an intravenous infusion (drip) given in a hospital clinic. The two courses are twelve months apart.
Relapses 	Highly effective: reduces the number of relapses you have by about 2/3. Any relapses you have should be less severe.
Lesions 	People taking Lemtrada have fewer, smaller or no new areas of active MS seen on MRI scans.
Disability 	Taking Lemtrada may slow down the build-up of MS disability.
Infection 	There is a high risk of viral infections in the first four weeks after taking Lemtrada. Treatment with Lemtrada may put you at increased risk of severe disease if you catch Covid-19.
Vaccines 	You should ensure your vaccinations are complete before taking Lemtrada. You may not make a full immune response to a new vaccine especially if given near a treatment course. You should not have live vaccines while taking Lemtrada but inactivated vaccines (such as flu or Covid-19) may be taken if medically necessary.
Pregnancy 	Pregnancy is not recommended during treatment and for four months after a treatment course with Lemtrada.
Breastfeeding 	You should not breastfeed while receiving a treatment course of Lemtrada.
Common, mild side effects	More than 1 in 100 people being treated with Lemtrada notice infusion reactions including headache, rashes, fever and nausea. Infections are a common side effect, including coughs, colds, chest infections, cold sores and shingles. You may also develop a low white blood cell count, changes to your heart rate or blood pressure, a rash or muscle pain.
Rare, serious side effects	People taking Lemtrada may be affected by serious side effects. 360 in 1000 people develop treatable thyroid disorders, 3 in 1000 develop kidney problems and 10 in 1000 people develop a blood clotting disorder.
Additional information	

How does Lemtrada work?

Lemtrada works by binding to and destroying immune cells (lymphocytes or white blood cells) which are involved when the immune system attacks myelin.

Who can take Lemtrada?

Lemtrada can be prescribed for adults with very active relapsing remitting MS. Lemtrada is unlikely to be prescribed if you have a condition that affects your heart or circulation, or another autoimmune condition as well as MS.

If you plan to start a family discuss your specific circumstances with your MS team. If you become pregnant while taking Lemtrada, and develop a thyroid disorder, the thyroid problem could be harmful to your baby if not treated.

How do I take Lemtrada?

You take Lemtrada as two treatment courses via intravenous (iv) infusion. The first course consists of iv infusions on five consecutive days. The second course is taken 12 months later and consists of iv infusions on three consecutive days. Most of the people who take Lemtrada will not require additional treatment courses; if you continue to experience relapses you may be offered a third treatment course for three consecutive days.

Before starting Lemtrada, you should have tests to measure blood cell counts and to check the function of your thyroid gland and kidneys. You should also be tested for immunity against the virus that causes chickenpox and offered vaccination if you have not previously been exposed to the virus.

Because of the serious nature of the potential side effects, it is vital that you have regular blood and urine tests for four years after your last treatment course to monitor blood cell counts and to check the function of your thyroid gland and kidneys.

What side effects could I get with Lemtrada?

Most people treated with Lemtrada are affected by infusion-related reactions but they are generally mild to moderate and short-lived. You will be given additional medication to reduce them.

Lemtrada suppresses the immune system for some time after a treatment course so people will be more vulnerable to infections such as colds and viruses. To reduce the risk of infections, you will be given medication to protect against herpes and listeria for a month following your infusion. Your MS team should give advice on other ways to minimise risk of infections, including foods to avoid.

Serious side effects have been noted in clinical trials, but are treatable if caught early. People taking Lemtrada will be monitored and informed of the early signs to look out for.

Other very rare but serious side effects have been reported from patient experience:

- serious disorders affecting the heart and blood vessels leading to possible bleeding or stroke. These may occur shortly after a Lemtrada infusion
- serious autoimmune disorders that may arise many months or years after the last treatment.

7. Further sources of information and support

An MS nurse will talk through your options, give practical advice and training and provide support as you start and throughout your treatment. This usually takes place at a nurse-led disease modifying drug clinic.

To find an MS nurse, contact the MS Trust helpline or visit the map of MS services on our website.

mstrust.org.uk/map

MS Trust Information

Website

MS Decisions

An online guide to the disease modifying drugs. It includes a guide to decision making, straightforward answers to frequently asked questions and an interactive tool to help explore and compare the options

mstrust.org.uk/msdecisions

Drugs in development

Provides information on drug therapies in clinical development

mstrust.org.uk/did

A-Z of MS

Covers a wide range of information about MS including symptoms and treatments, health professionals involved in management of MS and aspects of living with MS

mstrust.org.uk/a-z

MS Trust helpline

The MS Trust helpline is available to answer any questions about MS.

Contact us on Freephone 0800 032 3839 (Monday to Friday 9-5) or email **ask@mstrust.org.uk**

Electronic Medicines Compendium (eMC)

You can look up the full patient information leaflets for all the disease modifying drugs on this website

medicines.org.uk

MS Trust Facebook group

If you would like to hear from other people who have taken disease modifying drugs, you may wish to join our moderated public group on Facebook

8. Questions for your MS team

To get the most from discussions with your neurologist or MS nurse, it is helpful to prepare in advance.

- Make a list of the questions you want to ask.
- Keep a record of any relapses you have.
- Take a list of medications and supplements you are taking.

You might find it helpful to take a friend or family member along with you to appointments. They can support you or take notes, to help ensure that you ask all the questions you want to ask and get the answers that are important to you.

- What type of MS do I have?
- How active is my MS?
- What are my treatment options?
- What are the pros and cons of each option?
- Why should I consider taking this particular DMD?
- Will this DMD have a long-term effect on me, even if I stop taking it?
- What tests will I need before I start and when I'm taking this DMD?
- What are the side effects or risks associated with this DMD?
- What can be done to reduce the impact of side effects or the risks?
- Does this DMD affect other treatments I am taking?
- Does taking this DMD change my options for other treatments in the future?
- How long will I need treatment for?
- How will I know if the treatment is working?
- What are my options if the treatment is not working?
- What will happen if I don't have any treatment?
- Is there anything I can do to help myself?
- Where can I go for more information?

For more tips on how to make the most of appointments visit **mstrust.org.uk/making-most-appointments**

9. About the authors

Information Team, MS Trust

We are a UK charity that believes nobody should have to manage multiple sclerosis alone. We are here for everyone affected by MS, from the moment of diagnosis and throughout their journey.

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Notes

Notes

We hope you found this book useful.

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