

**Disease modifying
therapies (DMTs)
for MS**

now includes
**stem cell
treatment**

We're the MS Society. Our community is here for you through the highs, lows and everything in between. We understand what life's like with MS.

Together, we are strong enough to stop MS.

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A word from Tom, who has MS

I was diagnosed with multiple sclerosis (MS) in 2008. Within a year I went on a disease modifying therapy, or 'DMT'. I was having relapses and, together with my consultant, we decided I needed to start treatment.

It's reduced the number of relapses I was having. In 2015 I changed my drug and I've had only one relapse in three years. It's definitely made my day-to-day life with MS better.

For anybody looking at DMTs, especially for the first time, it might seem scary. Yes, there are good stories about DMTs, but they're hard to find on the internet. People often don't post online how they're doing OK, and that the drugs are working.

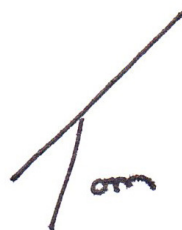
This booklet is to help you better understand the different drugs available. It lets you know what your options are.

Your decision about taking a DMT is important because it affects the most important person in your life – you.

But don't be overwhelmed by it. If you decide to take a particular drug, hopefully it's going to reduce the number of relapses you have and slow down your MS.

My advice is: don't keep things to yourself. Talk to your loved ones about treatment. Ask your MS nurse, if you have one. And don't be afraid to tell your neurologist what's on your mind and why.

So, do give the proper amount of thought to it. With the right support, you'll be more likely to pick the drug that's right for you. That way you too might soon be telling others that 'I'm doing OK'.

A handwritten signature in black ink, consisting of a stylized 'T' followed by the name 'Tom'.

Five things to know

- 1 You usually can't see the damage MS is causing. And it can be happening even if you're not having a **relapse**
- 2 The sooner you start treatment, the more difference it could make to your MS
- 3 A DMT can cut down the number of relapses you get and could slow down how fast your disability gets worse
- 4 Treatments that hit MS the hardest can also have the most serious side effects
- 5 A DMT will only help you if your type of MS is causing active inflammation. This means you get relapses - or your MRI scans shows new lesions, or old lesions have got bigger



About this booklet

This booklet explains how disease modifying therapies (DMTs) can make a difference to your MS, and who can have them.

If you get **relapses** with your MS, you're likely to qualify for a DMT. This is true no matter when you were diagnosed with MS.

If you've recently found out you have MS, official guidelines say your neurologist should talk to you about treatment within six weeks of being diagnosed.

This booklet looks at things to think about when deciding about treatment. You'll find out who can have each DMT, how you're given it, and its benefits and side effects.

It's important to know that you can only have a DMT if your MS is causing active **inflammation**. Signs of this are:

- you get relapses
- or doctors see new (or growing) **lesions** on your **MRI scans**

To get the most from this booklet, you need to know what type of MS you have.

If it's relapsing MS, how often have you been getting relapses? And are there new or growing lesions on your MRI scans?

If you have primary or secondary progressive MS, you'll only qualify for a DMT if it's still causing active inflammation.

Your neurologist can tell you what kind of MS you have, and whether your MRI scans show inflammation.

There's a lot to make sense of with DMTs. You can always ask questions by calling the MS Helpline on **0808 800 8000**. Or hear how other people on treatment are doing in our online forum at mssociety.org.uk/forum

One last thing. Where you see a word in bold in this booklet, it means you can turn to the back and find it explained.

What is MS?

If you know how MS affects your body, you'll understand better why treatment with a disease modifying therapy (DMT) can make a difference.

Your body's **immune system** fights off viruses and bacteria that get into your body and cause infections and diseases.

With MS this system attacks the nerves in your brain and spinal cord by mistake. It attacks the covering of these nerves, called **myelin**. This causes **inflammation** in the nerve, which can damage it.

Damage to this myelin covering means it's harder for signals to travel from your brain and along these nerves. Over time this affects the control you have over many parts of your body. This causes your MS symptoms.

The symptoms you get depend on which part of your brain or spinal cord your MS is affecting.

That's why MS affects everyone in different ways.

If the inflammation that MS causes isn't treated, over time it will permanently damage the nerves. DMTs can reduce this inflammation.

MS and relapses

About eight in ten people are diagnosed with MS that has **relapses** ('relapsing MS'). Relapses are periods when your MS symptoms flare up. You get new symptoms or old ones get worse. Afterwards they can go away, or you may be left with some symptoms or disability.

Over time MS causes damage to the nerves in your brain and spinal cord. A relapse is one sign that damage is happening.

What happens between relapses?

The time between relapses is called 'remission'. You might be left with some symptoms or disability

caused by your last relapse. But often you'll feel perfectly well again.

We used to think MS didn't cause any new harm between relapses. We now know it can.

MRI scans of people's brains show that MS can be causing inflammation and damage even when they're in remission. So, if you're not having relapses, it doesn't mean your MS has stopped being active.

The most obvious signs of how MS is affecting your brain and body are relapses, together with your MS symptoms or any disability you have.

But much of the damage MS causes won't give you symptoms. You won't know it's happening.

MRI scans of your brain or spinal cord can show if your MS is still active.

If it is, it'll show new or growing lesions. These are signs that MS is causing inflammation and damage to the nerves there.

Early on in your MS your body can repair a lot of the damage to the myelin that covers your nerves. But as time goes on, it gets harder for it to do this. This leads to a build-up of your symptoms and disability.

The good news is that, for many people who get inflammation in their nerves, DMTs dampen it down and slow down the damage MS is causing.

Find out more about MS and relapses in our booklet 'Managing a relapse' and at:
mssociety.org.uk/what-is-ms

“I'd love people who've just been diagnosed with relapsing MS to know it's not all doom and gloom. It's not as scary as you think. There are plenty of treatments and options to try, with new things being trialled.”
Lorraine

What if I have progressive MS?

Many people have progressive MS. It was either 'primary progressive MS' from the start. Or they had relapsing MS that over the years became 'secondary progressive MS'.

You can sometimes get relapses with progressive MS, but usually you don't. There's also much less inflammation. Instead you get a steady worsening of your MS as nerves are damaged and die.

If you don't get relapses or inflammation, DMTs won't help you. Instead you need treatments that repair damaged nerves and protect them from more damage.

These treatments don't exist yet. But there's a big push from researchers around the world to find drugs that will do this. Some are already being tested on people.

Primary progressive MS

One drug called ocrelizumab can work for some people with early primary progressive MS. It works best if MRI scans show inflammation, and if the person's not had this type of MS a very long time (for

example, they don't use a wheelchair). Read more on page 57.

Some people with early primary progressive MS can also get stem cell transplantation (HSCT) on the NHS. But only if MRI scans show active inflammation. There's more on stem cell treatment on page 64.

Secondary progressive MS

People with secondary progressive MS can have the DMT beta interferon. But only if they get relapses.

A new DMT called siponimod (its brand name is Mayzent) can slow down how fast disability gets worse in some people with secondary progressive MS. Whether it will get the go-ahead for use on the NHS is now being looked at. We hope to get a decision sometime in 2020.

If it's a yes, it's likely siponimod will only be for people with 'active' secondary progressive MS. This means they still have relapses and/or MRI scans show new or growing lesions. Unfortunately people who use a wheelchair won't be able to have it. Why people who use wheelchairs aren't given DMTs is explained on pages 15 and 16.

What is a DMT?

A Disease Modifying Therapy (DMT) is a treatment that, over the years, could change for the better ('modify') how your MS develops.

A DMT could be a drug you take. Sometimes you'll hear them called 'disease modifying drugs' (DMDs). A DMT could also be a treatment that uses stem cells.

A DMT isn't a cure, but it could make a real difference to your MS. These treatments can offer many people the chance to take more control of their MS.

How DMTs work

DMTs work by changing how your immune system behaves. They can make it less likely to attack the nerves in your brain and spinal cord so much.

This means less **inflammation** and less new damage to your nerves. But if nerves have suffered permanent damage, a DMT can't repair that.

When you're talking a DMT, you'll still be able to fight off infections, but perhaps not quite as well as before.

DMTs that we have at the moment only work by dampening down inflammation in the nerves. But most people with primary or secondary progressive MS don't have much inflammation. They're not likely to have relapses either.

So in the past DMTs have usually only been taken by people with relapsing MS. But some new DMTs can be used by a small number of people with progressive types of MS - if they have active inflammation.

The names of DMTs

Each drug has two names:

- its 'generic' name. This is the drug's actual name
- its brand name. This is the name used by the company who makes the drug when they sell it

The generic name will never change. But when different companies make their own version of it, they'll give it their own brand name.

Different brand names for some drugs are now starting to appear. To avoid confusion, in this booklet we use generic names, with brand names sometimes in brackets.



How well DMTs work

DMTs can be put into three groups, according to their impact on MS.

High (they can work very well):

- alemtuzumab (Lemtrada)
- natalizumab (Tysabri)
- ocrelizumab (Ocrevus) when used for relapsing MS
- haematopoietic stem cell transplantation (HSCT)

Good (they can work well):

- cladribine (Mavenclad)
- dimethyl fumarate (Tecfidera)
- fingolimod (Gilenya)

Moderate (they can work fairly well):

- glatiramer acetate (Copaxone and Brabio)
- five different beta interferons (Avonex, Betaferon, Extavia, Plegridy and Rebif)
- teriflunomide (Aubagio)
- ocrelizumab (Ocrevus) when used for early primary progressive MS

Ocrelizumab is a DMT that works against both relapsing MS and early primary progressive MS.

The better a DMT is at controlling MS, the more chance of side effects. Some of these can be very serious.

On pages 33 to 36 you'll find charts showing how the drugs rank when it comes to:

- how well they work
- their risk of serious side effects
- who can have each drug

How DMTs are given

Tablets – Some DMTs are tablets that you take once or twice a day. With one drug (cladribine) you take two courses of tablets, then you don't need to take them again for a few years.

Infusions – You take some DMTs through an 'infusion' (a 'drip'). You go to hospital for this, maybe staying the night.

You sit in a chair or lie on a bed. The drug is pumped into your bloodstream through a needle that goes into a vein in your arm or leg. An infusion takes two to four hours depending on the drug.

How often you have infusions is different for each drug. It can be every four weeks or every few months. For one DMT people usually only ever need two or three infusions.

Injections – Some DMTs you inject yourself with. You could ask a friend or a relative to do it. Depending on the drug, you'll inject every day, every other day, three times a week, once a week or every two weeks.

Injecting usually just means clicking on a 'pen' that you hold against your skin. You don't see the needle go in. Many people who didn't like the idea of injecting find they soon get used to this.

Your MS nurse or someone in your MS team can teach you to become good at injecting. This cuts the chance of side effects (such as infections) on the skin where you inject.

HSCT – cells are taken from your bone marrow. You have chemotherapy drugs to wipe out your immune system. These cells are then transplanted back into your body where they help a new immune system to grow. Find out more on page 64.

What could a DMT do for me?

A DMT won't cure your MS. It can't undo any permanent disability you have already. But you might find some symptoms get better.

When it's working well, a DMT can mean you have:

- fewer **relapses**
- relapses that aren't as serious
- maybe a slow-down in how fast your disability gets worse
- less build-up of damage (**lesions**) in your brain or spinal cord (seen on an **MRI scan**).

In fact, when a DMT is working very well, there may be no signs that your MS is active at the moment. That means:

- you're no longer having relapses
- your disability isn't getting worse
- MRI scans show lesions in your brain have stopped growing

and/or there are no new ones

- your brain isn't shrinking any faster

All our brains get a bit smaller as we get older, but with MS this can happen faster. DMTs can slow this down for many people.

Read more on pages 37 to 68 about how good each treatment is at cutting relapses and slowing down how fast people's disability gets worse.

Why starting treatment early is best

Evidence shows that a DMT works better the earlier you have it.

Damage caused by MS builds up over time and can be happening between relapses. So the sooner you have a DMT, the less your brain and body are likely to suffer this.

You won't be offered a DMT if you've been using a wheelchair for longer than six months. Earlier

studies seemed to show DMTs make no real difference to your MS if it's affected your legs this much.

But new studies are now looking at this again. They'll look at whether DMTs can slow down the effects of MS on arms and hands.

How early is 'early treatment'?

The **Association of British Neurologists (ABN)** recommends treatment starts as soon as possible after you're first told you have MS.

Guidelines from **NICE** also say that, if you're diagnosed with relapsing MS, your neurologist should talk to you about treatment and give you information about it.

You should also have a follow-up appointment six weeks after you're diagnosed to talk about treatment.

What else should happen?

You should be offered a review of your MS and its treatment at least once a year. This is true no matter what kind of MS you have, and even if you're not taking a DMT. This should be with someone with

a lot of experience with MS.

Guidelines say **MRI scans** are useful in keeping track of how active your MS is. You'll have check-ups with your neurologist, too. Scans and your check-ups will help with decisions about treatment.

If you're on treatment, ideally your once a year review will include an MRI scan to see how well your DMT is working.

You and your neurologist should agree your decisions about treatment together. Agree what you both want from treatment, and which one could be right for you. You should both come back to the decision you made and look at it again, ideally once a year.

Were you diagnosed a long time ago and have never had a DMT?

If you have relapsing MS and have had recent relapses, it's likely you'll qualify for treatment. If so, it's never too late to start.

How do I get DMTs?

Only a neurologist can start you on a DMT. He or she will follow guidelines about which DMTs you can have. They'll bear in mind:

- how many relapses you've had in the last year or two
- how bad they were

- if you've tried another DMT but it didn't work for you
- how active your MS is. For example, whether on your MRI scans there are new lesions (or old ones have got bigger)

You'll find more about the guidelines on page 31.



Getting an appointment

You have the right to ask for an appointment with your neurologist. You don't need to wait until you're offered one.

Depending on where you live, you might be able to book an appointment yourself. You can also ask your GP or MS nurse to refer you.

You should have your treatment looked at once a year at least.

This is true whether you're taking a DMT or not.

If you're not happy with how you're being treated, you have the right to ask for a second opinion.

Check out this webpage if you want more on getting a second opinion, or you're having problems getting treatment:

mssociety.org.uk/about-ms/treatments-and-therapies/getting-treatment-for-ms



Making my decision about a DMT

Deciding about treatment can seem complicated, perhaps even scary. You might think it's too soon, and that you'll wait and see what happens with your MS.

Treatment has risks. But leaving your MS untreated can mean in the long run your MS gets worse than it needs to be. And the evidence shows early treatment is likely to make the most difference to your MS.

Before you decide these are questions to ask:

- how well could a DMT keep my MS under control?
- what side effects might I get?
- if I take a DMT drug, how do I take it and how often?
- what tests will I need while I'm having treatment?
- how does a DMT fit into the life I lead? For example, injectable drugs may not be best for

people who fly a lot. Women who want to get pregnant should avoid some DMTs

- and, above all, which DMTs do guidelines say I can have?

“Make sure that you get all the information you need about your different options. Think about them, discuss them, weigh everything up and make an informed choice.”

Shirlee

Information to help me decide

Get hold of good-quality treatment information from an MS specialist or MS organisation. Not everything on the internet is accurate or relevant to your situation.

You can get a biased view of treatment online. People tend to post on the web if a DMT drug isn't working for them, or has side effects, but not when it's going well.



Hear Catherine, Natalie, Tamla, Andrew, Kirsty and Trevor talk about their decision to start treatment at mssociety.org.uk/treatmentstories

With stem cell treatments, it's the opposite. You hear more about success stories than from people who it hasn't worked for.

Neurologists are using **MRI scans** more and more to see how active someone's MS is and what treatment to go for. Together with the check-ups your neurologist gives you, scans can help you decide about treating your MS.

Spend time with someone who can help you understand what you need to know.

It's best to make decisions with your neurologist and, if you have one, your MS nurse. Talking to your GP, friends and family and other people with MS might help too.

You can ask questions and compare experiences with other people with MS on our online forums mssociety.org.uk/forums

See short films of the six people above talking about their experience of treatments at mssociety.org.uk/treatmentstories

Which DMTs will I be offered?

When deciding about your first DMT, you won't be able to have any one that you want. But you often have a choice from several treatments.

What you're offered will depend on how active your MS is, especially how many relapses you're having.

DMTs are divided into first, second and third line treatments.

First line DMTs, such as ones you inject, have fewer side effects but are less effective against MS.

Second line DMTs have more effect on MS but with more risk of side effects.

Third line DMTs hit MS hardest but have the highest risk of side effects, some very serious.

Escalation strategy

This means you start treatment with a first line DMT. Then, if you keep having relapses, treatment is escalated (increased) to a more powerful second line DMT. If this doesn't control your relapses, you'll then be moved up to an even harder-hitting third line DMT.

Induction strategy

This means using a harder-hitting DMT from the start. Once this brings your MS under control, you might then switch to a less powerful drug with fewer side effects to keep things stable.

This way of treating MS is often used if it's very active (you get regular relapses and MRI scans show new or bigger lesions).

Harder-hitting DMTs are usually kept for people whose MS is very active, especially if other DMTs haven't worked. And only a very small number of people are offered **HSCT**. That's because of its risks.

Side effects

Like any treatment, a DMT can have side effects. Not everybody gets them, or gets them as badly as other people. Doctors say DMTs are ‘well tolerated’. This means not many people stop taking them because of side effects.

We know a lot about treatments that have been around a long time. For example, the beta interferons have been around for two decades.

We know less about the newer ones. We’re learning more over time. As a general rule, the better a drug is at controlling MS, the more risk there is of serious side effects.

When thinking about side effects, you’ll need to know:

- what the side effects are, and how likely you are to get them
- how serious they could be. Some are mild and go with time. Others could be serious. Some very rare ones could put your life at risk
- how you would cope with side effects. What one person can

live with, someone else might not want to put up with. Get support from your MS team, especially the MS nurse. The companies that make the drugs also run support services like helplines

- what tests you’ll need. To check for side effects, you may need regular monitoring, such as blood tests

Your neurologist or MS nurse will tell you what side effects to look out for. If you find side effects of your DMT are too much, speak to your neurologist. It should be possible to change to another one.

We’ve listed some of the most common and most serious ones for each treatment on pages 37 to 68.

Weighing up the risks

Only you can decide what level of risk you’re happy to take. You’ll need to weigh up:

- possible risks against the benefits you could enjoy
- taking a DMT with fewer side effects but less impact, against



- a DMT with better results but more risk of serious side effects
- the risk of your MS getting worse if it goes untreated

Comparing DMTs

It can help to look at how the different treatments have done in trials. They tell us how well DMTs have controlled MS for large numbers of people.

They show us what side effects people can get, and how likely these are. But they can't say for certain how you yourself will react to a treatment.

Your decision won't be just about which treatment gets the best results in trials. Your quality of life matters too. You might choose one that's not as good at controlling MS but has fewer side effects, and is easier to live with.

Differences between trials can affect how good a DMT appears to be.

- Treatments given to people with MS that's not very active will appear to work better than if the trial involved people with more severe MS

- How long a trial lasts can affect how good the results look
- Older trials often compared a drug against a placebo (a dummy treatment with no drug in it). Trials today usually compare a new treatment against an existing MS drug. A DMT's results will look better if the trial compared it to a placebo

These differences could unfairly make some treatments look better than others. So a DMT might look less effective when the truth is, it works very well for lots of people and gives them a good quality of life.

“Talking to other people with MS has helped me a lot – people in the same position, people who’ve been through it. I meet people through local MS exercise groups, MS Society support groups, or just bumping into them at appointments.”

Lorraine

Sticking with the treatment

Two DMT drugs (alemtuzumab and cladribine) are only taken for two short courses. The others need to be taken long term. You might find it hard to keep taking yours. HSCT is a one-off treatment but it means long-term care afterwards.

‘I’ve started taking my DMT but don’t feel any better. Is it working?’

It can take six months before a drug starts to work. But some people feel better straight away. Others might never feel better, even when MRI scans show the DMT is working. Over a long time your DMT can still be lowering your chances of having a relapse or more disability even if you don’t feel any different.

‘Since starting my DMT, the side effects make me feel worse’

Some side effects get less or go away with time. If you have an MS nurse, they can often help with managing ones that don’t. If side effects are too much, speak to your neurologist. It might be

possible to change to another drug after a few months.

‘Even though I’m taking my DMT, I’ve had a relapse’

It can take months before you get the maximum protection from a DMT. So you could have a relapse before then. Even when it’s working, a DMT might not stop all relapses. But it can mean you get fewer of them, and the ones you do get are less serious.

Relapses are just one part of the picture. DMTs can also slow down how fast MS causes you disability. So, even if you do get a relapse, the DMT can still be helping you have less disability in the long run.

If you keep getting relapses, your neurologist can give you a harder-hitting treatment. Always report a relapse to them. Then he or she can decide if you need to be put on a different DMT.

‘I forget to take my DMT’ or ‘I’m tired of taking it’

A DMT works best when you follow how your neurologist said you should take it. If you find

sticking to it difficult, let your neurologist or MS nurse know. They can suggest tips to make it easier, or suggest a drug that might suit you better.

‘There are too many tests’

DMTs, especially the more powerful ones, can have side effects. So you might need regular monitoring. These tests catch problems early so that they can be treated before they get serious.

Before you start a DMT, your neurologist will talk to you about tests you need. If tests are too much for you, let them know. You might be able to switch to another treatment.

Looking again at what I decided earlier

Once a year or so, it’s a good idea for you and your MS team to look again at what you decided about treating your MS. For example, if you decided earlier not to take a DMT, you can change your mind.

Switching to another DMT

Your neurologist may talk to you about switching from the drug

you’re on to another. You might switch if any of these happen:

- you’re still getting relapses – maybe even worse than before
- MRI scans show new damage and inflammation (lesions)
- the DMT is no longer working as well because your body is making **neutralising antibodies** to it
- you find taking your DMT difficult. Maybe side effects are too much, or you have an allergic reaction to the drug
- a treatment comes along that’s better for you

You usually need to take a DMT for at least six months before switching (unless you get an allergic reaction to it – then you stop it at once). It’s your right to ask about different treatments if you feel the one you’re on isn’t right for you.

Stopping my DMT

Before you start a DMT, talk to your neurologist about when you might need to stop it. This can happen for different reasons.

You might need to stop because of a very bad side effect. Or you've taken the drug for at least six months but your relapses are as bad as before (or even worse). In both cases you can switch to a different DMT.

But there are two situations when you'll have to stop DMT treatment for good:

- if you had relapsing MS that's now become secondary progressive MS, and your relapses have stopped. When MRI scans show no signs of inflammation, and your disability keeps getting worse, then no DMT will work anymore
- if you can't walk anymore and need a wheelchair long term (longer than six months). Then you no longer qualify for a DMT at the moment. This might change. Studies are now looking at whether giving DMTs to people who use wheelchairs can protect their arms and hands from nerve damage

If you have to stop your treatment, this can be very upsetting. It can

help to talk to someone about how you feel about treatment, changes to your MS, or stopping treatment.

Call the MS Helpline on Freephone **0808 800 8000** (closed week-ends and bank holidays). Or email [**helpline@mssociety.org.uk**](mailto:helpline@mssociety.org.uk)

Or talk to others in our online forum at [**community.mssociety.org.uk/forum**](https://community.mssociety.org.uk/forum)

What if I can't take a DMT?

DMTs only work if you have relapses, or your MRI scans show signs of inflammation (new or growing lesions). This rules out most people with primary and secondary progressive MS, as they usually don't have relapses or much inflammation.

Researchers are looking for new drugs for people who can't benefit from DMTs. They won't reduce inflammation. They'll protect nerves and help your body repair the **myelin** that covers them.

So, if you don't qualify for the DMT treatments we have now, there's always hope different drugs will come along in the future.

Other health problems can mean it might be dangerous to take DMTs. So your neurologist will ask about your health and other medicines you're taking. You might need tests before you can start a DMT.

You still should see an MS specialist (neurologist or MS nurse) at least once a year to check how you're doing, even if

you're not taking a DMT. If you're not taking one, you can manage your symptoms with medicines. Steroids, for example, are good for more serious relapses.

Many people find physiotherapy and alternative or complementary medicine helpful. We have information on these. Call our Helpline or find it on our website.



Trying for a baby, pregnancy and breastfeeding

If you're a woman and want a baby, get advice from your MS specialist. This is true, too, if you get pregnant (or think you might be).

Some DMTs might harm unborn babies, so shouldn't be taken if you're trying to have a child, or if you become pregnant. With these DMTs you need to use reliable contraception (the 'pill' or condoms). Some other DMTs don't appear to be a risk to unborn babies. As of May 2019 one drug has a licence that allows it to be used during pregnancy: Copaxone, a brand of the drug glatiramer acetate.

With some DMTs, before you start trying for a baby, you need to stop taking it and let the amount of drug in your body fall to a safe level. The time this takes – the 'washout period' – is different for each drug. It can be from one to 12 months.

If you've just given birth, your chance of having a relapse can go up. That's why, soon after the baby's born, mums are recommended to start their DMT again. With some DMTs you musn't breastfeed.

Except for the two below, there's no evidence that DMTs affect a man's sperm. But if you're a man who wants to father a child, get advice from your neurologist.

Teriflunomide (Aubagio) could lower sperm counts. Small amounts of this drug can also be passed into a woman's body on sperm. This must be avoided as this drug could damage a baby if a man's partner becomes pregnant. Cladribine (Mavenclad) could also affect sperm. If you're a man, use contraception and not try to father a child while you're taking this drug (and for six months after your last dose).

To find out more about pregnancy and a particular DMT, check out our factsheets for each drug at mssociety.org.uk/dmts



A quick guide to each drug

On the pages that follow you'll find basic information on the DMTs that people can get on the NHS.

For each treatment we explain who it's for, how it works, how you have it, and what it could do for your MS. We've also included the more common or serious side effects.

We have more detailed factsheets about each of the DMT drugs at mssociety.org.uk/dmts

Who can have each DMT?

Neurologists use a number of guidelines to decide who is offered which treatment.

Guidelines from **NICE** say that to get DMTs you need to have 'active' MS. By this they usually mean you've had at least two relapses in the last two years.

Guidelines from the **ABN** say more and more MS specialists see 'active' MS as meaning you've had just one recent relapse and/or MRI

scans that show new damage (**lesions**) in your brain.

Since 2018 new rules exist for neurologists giving people DMTs on the NHS in England. They're similar to the earlier guidelines from NICE. They say you usually need two relapses in the last two years before you can have a DMT.

Doctors in Scotland, Wales and Northern Ireland use different guidelines to these new rules for England. These are mentioned in this booklet when they're different from England.

No matter which rules or guidelines your neurologist follows, you're usually offered harder-hitting drugs (with more serious side effects) only if other drugs with fewer side effects fail to control your MS.

You might be offered a harder-hitting drug from the start if your MS is very active.

On page 21 you'll find an explanation of how neurologists decide which treatments to offer people with MS.

Which treatments you'll be offered will depend on:













- how active your MS is
- whether you're being offered a first line treatment or the more harder-hitting second and third line treatments
- whether your neurologist is suggesting you have an escalation therapy or induction therapy

Over the next four pages you'll find tables that show you:












- which types of MS the licence for each drug allows it to be used for (in the UK and other countries)
- which DMTs the NHS will let you have as your first line treatment for different types of MS.

Information in this booklet shouldn't be used instead of advice from your MS specialist team. There are things individual to you that could affect how likely you are to get a side effect.

DMTS AT A GLANCE

DMT	impact on MS	side effects	can be used for
alemtuzumab (Lemtrada)			relapsing MS, especially if very active
beta interferons (Avonex, Betaferon, Extavia, Rebif, Plegridy)			relapsing MS, or secondary progressive MS with relapses, or CIS
cladribine (Mavenclad)			very active relapsing MS, especially if other DMTs haven't controlled it
dimethyl fumarate (Tecfidera)			relapsing MS
fingolimod (Gilenya)			very active relapsing MS, especially if other DMTs haven't controlled it
glatiramer acetate (Copaxone or Brabio)			relapsing MS or CIS

DMTS AT A GLANCE

DMT	impact on MS	side effects	can be used for
natalizumab (Tysabri)		 if you don't have JC virus  If you have JC virus	very active relapsing MS, especially if other DMTs haven't controlled it
ocrelizumab for relapsing MS (Ocrevus)			relapsing MS, especially if very active
ocrelizumab for primary progressive MS (Ocrevus)			early primary progressive MS
teriflunomide (Aubagio)			relapsing MS
HSCT			very active relapsing MS if hardest hitting DMTs can't control it. Also early progressive MS with inflammation



lowest risk



medium risk



higher risk



highest risk



FIRST LINE TREATMENTS FOR MY TYPE OF MS

I have	I might be offered on the NHS
Clinically isolated syndrome (CIS) - with a high risk of becoming MS	beta interferon or glatiramer acetate
relapsing MS	beta interferon, glatiramer acetate, teriflunomide and dimethyl fumarate* * in some situations also alemtuzumab and ocrelizumab
very active relapsing MS	fingolimod, cladribine, natalizumab and alemtuzumab. Also ocrelizumab (but only if you qualify to have alemtuzumab and that drug isn't suitable for you). Also HSCT, but only if the hardest-hitting DMTs haven't worked
secondary progressive MS with relapses	beta interferon
early primary progressive MS with relapses or active inflammation	ocrelizumab HSCT (but HSCT can't help most people with progressive MS)

Alemtuzumab

Brand name Lemtrada

You pronounce these: allem-TOOZER-mab and lem-TRAH-da

Who can have it?

Alemtuzumab is usually offered to you if your MS is very active, especially if other DMTs haven't controlled it.

Scotland, Northern Ireland and Wales

You can have this drug if:

- you have relapsing MS and, despite taking another DMT, you've had a **relapse** in the last year and **MRI scans** show new signs that your MS is active (you have new **lesions**)
- or, whether you've already had another DMT or not, you've had a recent relapse and/or MRI scans show new signs that your MS is active

In England

You're usually offered this drug only if:

- despite taking another DMT, you've had a relapse in the last year or MRI scans show new signs that your MS is active (you have new lesions)

You might be offered alemtuzumab as your **first** DMT if you meet one of the following conditions:

- you've had two relapses in the last two years
- or you've had two or more relapses in one year and MRI scans show new signs that your MS is active (you have new lesions)
- or you've had a relapse in the last two years and MRI scans show new signs that your MS is active (two or more new lesions have appeared over a year)

In rare circumstances you might be offered alemtuzumab in England if you've had a recent

relapse and/or MRI scans show new signs that your MS is active.

If you decide to take this drug, you and your neurologist must be happy to accept its higher risk, and the need for extra blood and urine tests.

How it works

Alemtuzumab kills certain types of cells made by your immune system. Called T and B cells, they normally attack viruses and bacteria that get into your body. But in MS they attack nerves in your brain or spinal cord by mistake.

Alemtuzumab stops these cells getting into your brain and spinal cord before they can damage these nerves. This drug ‘resets’ your immune system. It changes it for good, which is why you don’t have to keep taking it.

How you take it

You’re given this drug in hospital through a drip (an ‘infusion’). Most people only need two infusions, spaced 12 months apart.

For the first infusion you go to hospital for five days in a row. Each day you have an infusion that takes about four hours. You might go home every day two hours after your infusion, or you may stay in hospital for your treatment.

You have the second infusion a year later, over three days in a row, again for about four hours each day. Between three people in ten and four in ten need a third or fourth infusion before the drug works.

How well does alemtuzumab work?



The effectiveness of this drug is classed as ‘high’.

Relapses dropped by: 50-55% compared to beta interferons

This means that in trials, on average, people saw the number of relapses they had fall by half (by 50-55%). This was compared to people who took beta interferons, a standard treatment for MS.

How many people stayed free of relapses when they took this drug?

Trial one

78% of people who took alemtuzumab in one trial stayed free of relapses for two years. They'd never taken a DMT before.



59% of people on beta interferons stayed free of relapses.



orange = no relapses

Trial two

65% of people who took alemtuzumab in another trial stayed free of relapses over two years. They'd taken a DMT before that hadn't stopped their relapses.



47% of people on beta interferons stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: **up to 42%** compared to beta interferons

This means that in one trial, on average, people saw a 42% drop in the risk of their disability getting worse. This was compared to people who took beta interferons.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 87% of people who took alemtuzumab.



Disability didn't get worse for 80% of people who took beta interferons.



purple = disability didn't get worse

In the other trial, people taking alemtuzumab saw a 30% drop in the risk of their disability getting worse. But this drop wasn't big enough to be seen as 'significant'. In other words, it could have happened by chance and not because of the drug.

What about side effects?

High risk



Compared to other DMTs the risk of side effects, especially serious ones, is high.

More than one in ten people get infections of the chest, throat, urinary tract and sinuses (the spaces around your nose).

After an infusion most people get one or more of these: headaches, rash, fever, feeling or being sick, hives (a skin rash), itching, going red in the face and neck and feeling tired. These usually soon go away.

You'll need tests to check for side effects for four years after your last infusion.

Thyroid problems

Up to four in ten people get a thyroid problem. It's treatable but needs lifelong medication. If this happens, you can still carry on taking alemtuzumab.

ITP

Between one and three people in a hundred get a problem with their blood called ITP (immune thrombocytopenic purpura). It can be very serious, but it's treatable if caught early by a blood test. Symptoms include bruising and bleeding too easily.

Under investigation

In 2019 use of this drug was restricted while serious new side effects were investigated. These happened within three days of starting it. They include stroke, heart attack and blood vessels tearing in the neck or head. Liver and heart damage are also being looked into.

Learn more at mssociety.org.uk/what-we-do/news/alemtuzumab-safety-review

Beta interferons

You pronounce this: BEE-ter inter-FEER-ons

There are five beta interferons. Their brand names are:

- Avonex
- Betaferon
- Extavia
- Plegridy
- Rebif

Betaferon and Extavia are exactly the same drug. From 2018 new patients in England and Wales won't be given Betaferon.

Who can have them?

In **Scotland, Northern Ireland** and **Wales** you can have these drugs if:

- you have relapsing MS and you've had a recent **relapse** and/or **MRI scans** show new signs that your MS is active (you have new **lesions**)
- you have secondary progressive MS but you still have significant relapses
- you have a **clinically isolated**

syndrome or **CIS** (a first attack of MS-like symptoms) and a brain scan shows you're likely to go on to get MS

In **England** you can have these drugs if:

- you've had two relapses in the last two years
- you've had one relapse in the last two years and MRI scans show new signs that your MS is active (you have new lesions)
- you have a **clinically isolated syndrome** or **CIS** (a first attack of MS-like symptoms) and a brain scan shows you're likely to go on to get MS
- you have secondary progressive MS but you still have significant relapses (at least two in the last two years)

How they work

Your body makes its own interferons (a protein) to dampen down **inflammation**. These drugs are man-made versions. They can reduce (and might prevent) the inflammation that damages nerves in MS.

How you take them

Beta interferons are all injected. Many come in a ‘pen’ that lets you inject without you needing to see the needle go into your skin.

Avonex	Injected into muscle	Comes as a pre-filled syringe, automatic injecting pen	Once a week
Betaferon	Injected under the skin	Comes as a powder that you mix before you inject it	Every other day
Extavia	Injected under the skin	Comes as a powder, that you mix before you inject it with a syringe or automatic injecting pen	Every other day
Plegridy	Injected under the skin	Comes as a pre-filled syringe or automatic injecting pen	Every two weeks
Rebif	Injected under the skin	Comes as a pre-filled syringe, automatic injecting pen or the RebiSmart electronic injection device	Three times a week

How well do beta interferons work?

The effectiveness of these drugs is classed as 'moderate'.



Relapses dropped by: 33%
compared to a placebo

This means that in trials, on average, people saw a 33% drop in the number of relapses they had. This was compared to people who took a placebo, a dummy treatment with no drug in it.

Disability getting worse was slowed down by: a modest amount

This means that in trials, on average, people saw only a modest drop in the risk of their disability getting worse. This was compared to people who took a placebo.

Long-term evidence from people on beta interferons for years shows their effect is much bigger than 'modest' if you start one early on in your MS.

What about side effects?



Lowest risk

Compared to other DMTs, the risk of side effects, especially serious ones, is among the lowest.

At least one in ten people find that after the injection they feel like they have flu, with headaches, muscle aches, chills or a fever.

These usually last for no more than two days (48 hours) after the injection and often get better the longer you use the drug. Injecting before you sleep can help, and so can ibuprofen or paracetamol.

Your skin can become red, hard, bruised or itchy where you inject. Beta interferons might cause depression, so you might not be given one if you've had depression in the past.

There can be other less common side effects with beta interferons. Our factsheet has more details at mssociety.org.uk/dmts

Cladribine

Brand name **Mavenclad**

You pronounce these: CLAD-ree-been and MAY-ven-clad

Who can have it?

You can have this drug if:

- you have ‘highly active’ relapsing MS. This means you’ve had two or more disabling relapses in the past year and MRI scans show you have more, or bigger, lesions. Guidelines call this ‘rapidly evolving severe relapsing remitting MS’
- or, despite taking a DMT, you’ve had a relapse in the past year and new or bigger lesions can be seen on your MRI scans

How it works

Your immune system makes blood cells that fight off viruses and bacteria when they get into your body. These white blood cells (or lymphocytes) are called T and B cells.

But in MS these cells attack the myelin covering around the nerves in your brain and spinal cord by mistake.

Cladribine stops these cells, especially the B cells, from getting into your brain and spinal cord. That way they can’t damage the nerves there.

How you take it

You take this drug as a tablet.

You start by taking the pills for five days at the beginning of the first month and then for another five days at the beginning of the second month. This is then repeated a year later.

Hopefully this will control your MS. Its effect has so far lasted for four years in people who’ve taken this drug. They’re being studied to see if they need to take it again a few years later.

How well does cladribine work?

The effectiveness of this drug is classed as 'good'.



It's too early to say exactly where cladribine ranks with the other MS drugs because no trial has yet judged it against them. Also, it's only now becoming available to many people.

Looking at the impact cladribine has on relapses and on stopping disability getting worse, it should be classed as 'good' at the very least and may turn out to be 'high'.

Relapses dropped by: 58%
compared to a placebo

This means that in a trial, on average, people saw the number of relapses they had fall by over half (by 58%). This was compared to people who took a placebo, a dummy pill with no drug in it.

How many people stayed free of relapses when they took this drug?

Nearly 80% of people who took cladribine stayed free of relapses over nearly two years.



Over 60% of people who took a placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: 47% compared to a placebo

This means that in a trial, on average, people saw their risk of their disability getting worse fall by almost half (by 47%). This was compared to people who took a placebo.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 86% of people who took cladribine.



Disability didn't get worse for 79% of people on the placebo.



purple = disability didn't get worse

What about side effects?

Medium risk



Compared to other DMTs the risk of side effects, especially serious ones, is somewhere in the middle.

Cladribine doesn't weaken your immune system as much as some other DMT drugs. So the risk of getting infections isn't as high.

The most common side effect is a drop in the number of your white blood cells that fight infections (lymphopenia). Between one in four and one in three people get

this. Cladribine is meant to make this happen, but this drop might last a long time and be severe.

Other side effects can include a slightly higher risk of getting headaches and colds, and also infections caused by the herpes viruses. This includes the skin rash shingles, which one in 50 people get.

Before you take cladribine you'll be vaccinated against some infections like chicken pox.

An earlier study seemed to show a higher risk of cancer, but we now know this isn't the case.

There may be a very small risk of the brain infection called PML (see page 73). So far no one with MS taking cladribine has got PML but three people taking it for other health problems did get it. People with MS taking this drug will have their blood checked regularly to reduce the risk of PML.

There can be other less common side effects with cladribine. Our factsheet has more details at mssociety.org.uk/dmts

Dimethyl fumarate

Brand name Tecfidera

You pronounce these:
dye-METH-ul FUME-er-ayt
and teckfer-DAIR-ah

Who can have it?

In **Scotland, Wales** and **Northern Ireland** you can have this drug if:

- you have relapsing MS and you've had a recent **relapse** and/or **MRI scans** show new signs that your MS is active (you have new **lesions**)

In **England** you can have this drug if:

- you've had two relapses in the last two years

How it works

We don't know exactly how this drug works, but it dampens down **inflammation**. This may be helpful in reducing the inflammation that causes damage in the brain and spinal cord of people with MS.

How you take it

You take it as a tablet twice a day.

How well does dimethyl fumarate work?

The effectiveness of this drug is classed as 'good'.



Relapses dropped by: 53% compared to a placebo

This means that in one trial, on average, people saw the number of relapses they had fall by over half (by 53%). This was compared to people who took a placebo, a dummy pill with no drug in it.

How many people stayed free of relapses when they took this drug?

73% of people who took dimethyl fumarate in one trial stayed free of relapses for two years.



54% of people who took the placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: **38%** compared to a placebo

This means that in one trial, on average, people saw a 38% drop in the risk of their disability getting worse. This was compared to people who took a placebo.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 84% of people who took dimethyl fumarate.



Disability didn't get worse for 73% of people who took the placebo.



purple = disability didn't get worse

Results weren't quite as good in another trial. Then 71% who took dimethyl fumarate had no relapses compared to 59% who took a placebo. And 87% who

took dimethyl fumarate saw no worsening of their disability compared to 83% of people on the placebo. This difference in disability getting worse isn't big enough to be statistically significant. That means it might have happened by chance, not because of the drug.

What about side effects?



Medium risk

Compared to other DMTs the risk of side effects, especially serious ones, is somewhere in the middle.

In one study up to four in ten people had one or more of these: flushing (going red in the face), feeling hot, upset stomach, diarrhoea, headache or feeling sick.

This drug is in general seen as 'medium risk' for side effects. But there's an extremely rare side effect called **PML** that you should know about.

PML: a very rare side effect

Dimethyl fumarate can increase your chances of getting a rare brain infection called

PML (progressive multifocal leukoencephalopathy). The risk is extremely small, but PML can kill or leave a person seriously disabled. Your blood will be tested every three months and the drug stopped if your doctor feels you're at risk of PML. As of September 2018 five people have got it out of over 230,000 across the world taking dimethyl fumarate.

There can be other less common side effects with dimethyl fumarate. Our factsheet has more details at mssociety.org.uk/dmts

Fingolimod

Brand name Gilenya

You pronounce these: finn-GOLLY-mod and jill-EN-ee-yer

Who can have it?

In **Scotland** and **Wales** you can have it if:

- you have **highly active relapsing remitting MS** and another DMT hasn't worked for you, or
- you've had two or more

disabling **relapses** in one year and an **MRI scan** shows you're getting more **lesions**

In **England** and **Northern Ireland** you can have it if:

- you have the same or an increased number of relapses despite treatment with beta interferons (Avonex, Rebif, Betaferon, Extavia and Plegridy), glatiramer acetate (Copaxone), dimethyl fumarate (Tecfidera) or teriflunomide (Aubagio)

Across the UK:

You might be switched to fingolimod if you're taking natalizumab (Tysabri) and are at high risk of developing the brain infection **PML**.

Fingolimod can also be used as your first DMT if you have **highly active relapsing MS** or **rapidly evolving severe relapsing remitting MS**.

How it works

Special types of cells in your immune system, called T and B

cells, are thought to cause a lot of the damage in MS. They normally kill viruses and bacteria that get into your body, but in MS they damage your nerves. Fingolimod stops them leaving your lymph nodes where they're made. This means far fewer of them get into your brain and spinal cord where they would attack the covering (**myelin**) around your nerves.

How you take it

Fingolimod is a tablet you take once a day.

How well does fingolimod work?

The effectiveness of this drug is classed as 'good'.



Relapses dropped by: 54% compared to a placebo

This means that in a trial, on average, people saw the number of relapses they had fall by over half (by 54%). This was compared to people who took a placebo, a dummy pill with no drug in it.

How many people stayed free of relapses when they took this drug?

70% of people on fingolimod stayed free of relapses over two years.



46% of people who took the placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: 30% compared to a placebo

This means that in a trial, on average, people saw a 30% drop in the risk of their disability getting worse. This was compared to people who took a placebo.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 82% of people who took fingolimod.



Disability didn't get worse for 76% of people who took a placebo.



purple = disability didn't get worse

What about side effects?

Medium risk

Compared to other DMTs the risk of side effects, especially serious ones, is somewhere in the middle.



More than one in ten people get diarrhoea, back pain, cough, headache, tiredness or have more chance of getting infections like flu.

After your first dose of fingolimod your heart can slow down, or its beat becomes irregular. So you're given your first dose in hospital and monitored for at least six hours. Your heart soon goes back to normal.

PML: a very rare side effect

There's a risk of a rare brain infection called **PML (progressive multifocal leukoencephalopathy)**. PML can kill or leave you seriously disabled. The risk of getting it while on this drug is extremely small. As of August 2017 15 people around the world had definitely or probably got PML from taking fingolimod. This works out as a risk of less than one in 10,000.

There's a virus that makes your risk of getting PML higher. Your specialist can tell from a blood test if you have it. If you do, your MS team will talk to you about PML and what you can do about it.

There can be other less common side effects with fingolimod. Our factsheet has more details at mssociety.org.uk/dmts

Glatiramer acetate

Brand names Copaxone and Brabio

You pronounce these: gla-TIR-a-mer ASS-er-tate, co-PAX-own and BRABB-bee-oh

Since 2018 glatiramer acetate has also been available under the brand name Brabio, as well as the older brand Copaxone.

Who can have it?

In **Scotland, Wales** and **Northern Ireland** you can have this drug if:

- you have relapsing MS and you've had a recent **relapse** and/or **MRI scans** show new signs that your MS is active (you have new **lesions**)

In **England** you can have this drug if:

- you've had two relapses in the last two years
- you've had one relapse in the last two years and MRI scans show new signs your MS is active (you have new lesions)

Across the UK you can have it if:

- you have a **clinically isolated syndrome** or **CIS** (a first attack of MS-like symptoms) and a brain scan shows you're likely to go on to get MS.

How it works

It's not clear how glatiramer acetate works, but it seems to kill the immune cells that attack the coating (**myelin**) around your nerves.

How you take it

You inject it under the skin three times a week.

How well does glatiramer acetate work?

The effectiveness of this drug is classed as 'moderate'.



Relapses dropped by: 34%
compared to a placebo

This means that in a trial, on average, people saw a 34% drop in the number of relapses they had.

This was compared to people who took a placebo, a dummy treatment with no drug in it.

How many people stayed free of relapses when they took this drug?

77% of people on glatiramer acetate stayed free of relapses over one year.



66% of people who took the placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: a modest amount

This means that in a trial, on average, people saw a modest drop in the risk of their disability getting worse. This was compared to people who took a placebo.

Long-term evidence from people on glatiramer acetate for years shows its effect is much bigger than 'modest' if you start it early on in your MS.

What about side effects?

Lowest risk



Compared to other DMTs the risk of side effects, especially serious ones, is among the lowest.

After their injection some people go red in the face (flushing), become breathless or feel their heart pounding for a short time.

Most people find that where they inject into their skin it bruises, becomes itchy or goes red or hard. You could also get dents in your skin where you inject.

More than one in ten people also get one or more of these: headaches, a rash, flu-like symptoms, feeling anxious or depressed, joint or back pain or feeling weak or sick.

There can be other less common side effects with glatiramer acetate. Our factsheet has more details at mssociety.org.uk/dmts

Natalizumab

Brand name Tysabri

You pronounce these: nata-LEE-zoo-mab and ty-SAB-ree

Who can have it?

In **Scotland, Wales** and **Northern Ireland** you can have this drug if:

- you have relapsing MS and you've had a **relapse** in the last year, and **MRI scans** show new signs that your MS is active (you have new **lesions**). This is despite taking another DMT
- you have relapsing MS and you've had at least two relapses in the last year, and MRI scans show new signs that your MS is active. This is happening whether or not you've been taking another DMT

In **England** you can have this drug if:

- you have relapsing MS and you've had at least two relapses in the last year, and MRI scans show new signs that your MS is active. This is happening whether or not you've been taking another DMT

How it works

Your immune system makes special types of cells that fight off viruses and bacteria. But in MS these cells are thought to target nerves in your brain or spinal cord by mistake.

Natalizumab sticks to these cells (called T cells), stopping them from getting into your brain and spinal cord.

This stops them attacking the covering (**myelin**) around these nerves and causing **inflammation** and damage.

How you take it

Natalizumab is given through a drip (an 'infusion'). It takes about an hour, with another hour to be monitored.

You need to go to hospital once every four weeks for the infusion. You don't need to stay overnight.

How well does natalizumab work?

The effectiveness of this drug is classed as 'high'.



Relapses dropped by: 68% compared to a placebo

This means that in a trial, on average, people saw a 68% drop in the number of relapses they had. This was compared to people who took a placebo, a dummy treatment with no drug in it.

How many people stayed free of relapses when they took this drug?

67% of people who took natalizumab stayed free of relapses over two years.



41% of people who took the placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: 42% compared to a placebo

This means that in a trial, on average, people saw a 42% drop in the risk of their disability getting worse. This was compared to people who took a placebo.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 83% of people who took natalizumab.



Disability didn't get worse for 71% of people on the placebo.



purple = disability didn't get worse

What about side effects?

Medium to higher risk

Compared to other DMTs, the risk of side effects, especially serious ones, is among the highest. The risk is bigger if you have the JC virus.

If you don't have the JC virus:



medium risk

If you do have the JC virus:



higher risk

You might get the following for a while after an infusion: hives (itchy skin), headache, shivers, stomach upset, joint pains, sore throat or feeling sick, tired or dizzy.

PML: a rare but serious side effect

Natalizumab can increase your chances of getting a rare brain infection called **PML (progressive multifocal leukoencephalopathy)**.

Up to one in four who get PML can die from it.

The risk of getting PML is small. By the end of 2017 around 756 people taking it had got PML (out of over 180,000 people across the world on this drug). That's about four people in every thousand.

Having a virus called the JC virus makes your risk of getting PML higher. If you don't have this virus, you're extremely unlikely to get PML. Only one in over 10,000 people who don't have this virus get PML.

If you do have the virus, one in 500 people at the highest risk get PML in the first two years. After that the risk goes up a lot.

If your PML risk is high, your MS specialist might switch to a different DMT. Or, if you have a longer gap between your infusions, that lowers the risk a lot.

If you take natalizumab, you'll get blood tests that look for the JC virus that causes PML. If you're at risk of PML, you'll be checked for early signs of it.

Your health care team will tell you what to look out for and what to do if you notice signs of PML.

There can be other less common side effects with natalizumab. Our factsheet has more details at mssociety.org.uk/dmts

Ocrelizumab

Brand name Ocrevus

You pronounce these: ock-ree-LEE-zoo-mab and ock-REE-vuss

Who can have it?

This drug can be given to people with active relapsing MS who qualify to have the DMT alemtuzumab (Lemtrada) but who, for various reasons, can't take that drug.

Ocrelizumab is also given to a small number of people with early primary progressive MS.

Relapsing MS

In **England, Wales, Scotland** and **Northern Ireland** you can have this drug if:

- you've got 'active relapsing MS' (you're having relapses or MRI scans show new lesions)
- **and** you qualify to take alemtuzumab but that drug isn't suitable for you

So, ocrelizumab is an alternative to alemtuzumab if you can't take that drug for some reason, or you have worries about its side effects

and risk. You're most likely to be offered alemtuzumab if your MS is very active.

Primary progressive MS

In **England** and **Wales** you can take ocrelizumab if you have:

- early active primary progressive MS

The following also need to be true:

- your MRI scans show signs of inflammation. You need a T1 MRI scan to show you have 'enhancing lesions' (this means a lesion has happened recently). Or you need two or more T2 MRI scans that show you have new or growing lesions
- you have a score on the **Expanded Disability Status Scale (EDSS)** between 3 and 6.5 (6.5 means you need two walking aids – such as canes or crutches – to walk 20 metres without having a rest)
- you have early disease. This means that, if you're less disabled (EDSS score of 5 or under), your MS must have started in the last 10 years. If

you're more disabled (EDSS score over 5), it means it must have started within the last 15 years. A score of 5 means disability gets in the way of your daily activities but you can walk without an aid for 200 metres

Scotland and Northern Ireland

We hope that later in 2019 people with early primary progressive MS in Northern Ireland will also be able to get ocrelizumab on the NHS.

In Scotland the makers of ocrelizumab have applied for the go-ahead for people with early primary progressive MS to get the drug on the NHS. A decision is expected before the end of 2019.

For the latest on this drug's availability, check out mssociety.org.uk/about-ms/treatments-and-therapies/disease-modifying-therapies/ocrelizumab

How it works

Your immune system makes special cells that attack and kill viruses and bacteria. In MS these cells attack your nerves by mistake. Ocrelizumab sticks to one type of

these cells called B cells and helps kill them. This stops them from destroying the covering around your nerves (**myelin**), causing **inflammation** and damage.

How you take it

You're given this drug through a drip ('infusion') in hospital. The first dose is two infusions two weeks apart. After that you have an infusion every six months.

How well does it work on relapsing MS?

Against relapsing MS the effectiveness of this drug is classed as 'high'



Relapses dropped by: 46-47%
compared to a beta interferon

This means that in two trials, on average, people saw the numbers of relapses they had drop by almost half (by 46% in one trial, by 47% in the other). This was compared to people who took a beta interferon, a standard treatment for MS.

How many people stayed free of relapses when they took this drug?

Over 80% of people who took ocrelizumab stayed free of relapses over two years.



Over 70% of people who took beta interferon stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: 40% compared to a beta interferon

This means that in two trials, on average, people saw a 40% drop in the risk of their disability getting worse. This was compared to people who took a beta interferon.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 92% of people who took ocrelizumab.



Disability didn't get worse for 88% of people who took a beta interferon.



purple = disability didn't get worse

Ocrelizumab seems to be a much better treatment for relapsing MS than beta interferons. It also seems to be as good as the best of the other DMTs, but without as many side effects.

How well does it work on progressive MS?

The effectiveness of this drug on primary progressive MS is 'moderate'. Its effect in trials may not seem very big, but this type of MS has always been the hardest to understand and treat. It's the first drug to work against primary progressive MS.



In trials this drug has shown that, for people with early primary progressive MS, it could delay their need for a wheelchair by seven years.

Disability getting worse was slowed down by: 25% compared to a placebo

This means in a trial, on average, people saw a drop of about 25% in the risk of their disability getting worse. This was compared to people who took a placebo, a dummy treatment with no drug in it.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over six months for 70% of people who took ocrelizumab.



Disability didn't get worse for 64% of people who took a placebo.



purple = disability didn't get worse

The drug also helped people walk better, slowed down how fast their brains were shrinking, and made lesions in their brain smaller.

What about side effects?

Medium risk



Compared to other DMTs the risk of side effects, especially serious ones, doesn't seem high. In trials side effects weren't any more serious than those you get with beta interferons. Up to four in ten people had at least one fairly mild reaction to their infusion.

You're more likely to get some infections. These include colds, chest and skin infections, cold sores and other herpes infections.

Compared to other DMTs that are as good at controlling MS, ocrelizumab seems so far to have far fewer side effects. In trials more people taking this drug got cancer. It's not yet clear if this is a side effect of the drug.

So far there have been no cases where this drug definitely caused the serious brain infection **PML** (see page 73). PML might be a risk for people taking this drug for MS because it's happened to some people taking a very similar drug for other health problems.

Teriflunomide

Brand name Aubagio

You pronounce these: terry-FLOO-nee-mide and oh-BAH-jee-oh

Who can have it?

In **Scotland, Wales** and **Northern Ireland** you can have this drug if:

- you have relapsing MS and you've had a recent **relapse** and/or if **MRI scans** show new signs that your MS is active (you have new **lesions**)

In **England** you can have this drug if:

- you've had two relapses in the last two years

How it works

We don't know exactly how this drug works but it dampens down **inflammation**.

Your immune system makes cells, called T cells, that normally fight off viruses and bacteria that cause infections. But in MS these cells are believed to attack and damage the **myelin** coating around your nerves.

T cells are white blood cells (lymphocytes). Taking this drug blocks them. Fewer of them get into your brain and spinal cord to cause inflammation and damage there.

How you take it

Teriflunomide is a tablet you take once a day.

How well does teriflunomide work?

The effectiveness of this drug is classed as 'moderate'.



Relapses dropped by:

31% compared to a placebo

This means that in a trial, on average, people saw a 31% drop in the number of relapses they had. This was compared to people who took a placebo, a dummy pill with no drug in it.

How many people stayed free of relapses when they took this drug?

57% of people who took teriflunomide stayed free of relapses over two years.



46% of people who took the placebo stayed free of relapses.



orange = no relapses

Disability getting worse was slowed down by: 30% compared to a placebo

This means that in a trial, on average, people saw a 30% drop in the risk of their disability getting worse. This was compared to people who took a placebo.

How many people's disability didn't get worse when they took this drug?

Disability didn't get worse over two years for 80% of people who took teriflunomide.



Disability didn't get worse for 73% of people who took the placebo.



purple = disability didn't get worse

What about side effects?

Lowest risk



Compared to other DMTs, the risk of side effects, especially serious ones, is among the lowest.

More than one in ten people get headaches, diarrhoea or feel sick. Your hair may get thinner, but it grows back after six months.

You might be more likely to get common infections like colds, cold sores, urinary tract or chest infections.

There can be other less common side effects with teriflunomide.

Our factsheet has more details at mssociety.org.uk/dmts



A quick guide to HSCT

There's now a new sort of DMT – a particular kind of stem cell therapy. A small number of people with a certain type of MS can have it on the NHS. But only if the hardest-hitting DMTs can't control their MS.

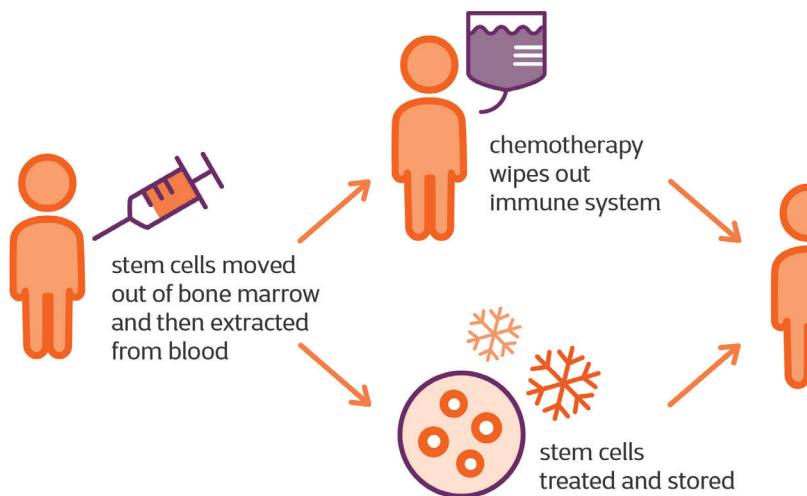
HSCT stands for 'haematopoietic stem cell transplantation'. It's had a lot of media attention recently. Researchers are still working on it. It's already giving exciting results.

Studies haven't looked at how well HSCT controls MS compared to the hardest-hitting DMT drugs. This is now being looked into.

The science behind HSCT

MS happens when cells in your immune system aren't working properly and are attacking your nerves. HSCT wipes out these faulty cells using chemotherapy. It then replaces them with new ones.

Unlike most cells in your body, a stem cell can grow into lots of



different kinds of cells. This includes cells in your immune system.

By killing off your faulty immune cells, and replacing them with stem cells, these cells can grow into a new immune system. Hopefully it will be free of MS.

How you have HSCT

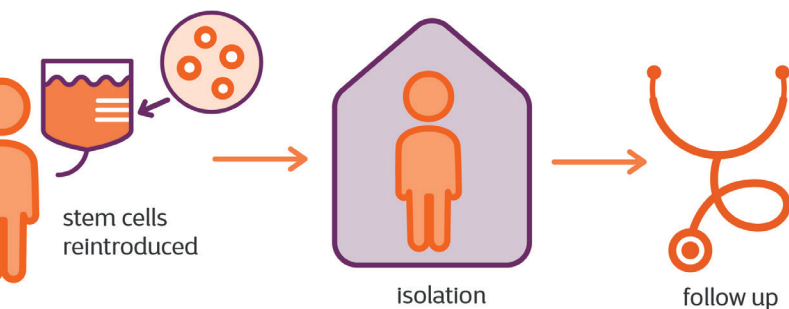
Stem cells are taken from your bone marrow and frozen. Next you take chemotherapy drugs to kill your harmful immune cells.

Then your stem cells are put back into your blood stream. There they'll rebuild your immune system so that works like it should.

Who can have HSCT?

HSCT is sometimes offered to people on the NHS. This will usually be if:

- MRI scans show you have active inflammation (you have new **lesions**)
- if you've had the hardest-hitting DMT drugs, but they're not controlling your MS
- you've not had MS symptoms for a very long time
- you don't have a lot of disability (you don't permanently need a wheelchair)



The people who do best after HSCT are ones with **highly active relapsing remitting MS**. That means they're having relapses despite having been on DMT drugs.

HSCT can't undo permanent damage that's already been done. But some disability might go once HSCT stops the inflammation in your nerves, and your body can now repair the damage it caused. This might be seen with other DMTs, too.

Trials show HSCT isn't likely to help if you have primary or secondary progressive MS that has no inflammation in your brain or spinal cord.

But if you have early progressive MS, and MRI scans still show active inflammation (new lesions), then this treatment may be able to help with your MS.

MS specialists don't yet agree whether the risks and long-term side effects of the chemotherapy are worth the benefits of HSCT.

HSCT is available on the NHS to the small number of people who meet

the conditions on page 65. But some people pay to have HSCT (or a different kind of stem cell therapy) in clinics abroad. These clinics are less strictly regulated and may not have the high standards of UK clinics.

How well does HSCT work?

The effectiveness of this treatment is classed as 'high'.



For some people HSCT has very good and long-lasting results. For others their MS does get better, but this doesn't last. Others see no difference, or even feel their MS is worse than before.

If you're looking at studies of HSCT, you'll see they have very small numbers of people in them. Trials of DMT drugs look at many more people. The bigger the trial, the more reliable its results are.

Trial one

The most recent trial followed 55 people with relapsing MS who had HSCT. It compared them to 55 people who were still getting relapses despite taking DMT drugs

(but not some of the most hard-hitting ones).

Almost all of the people who had HSCT showed no signs that their MS was still active a year after the treatment.

Their level of disability also got better as inflammation in their brains and spinal cords stopped. Only one person had a relapse. There were 39 relapses in the people taking DMT drugs.

How many people stayed free of relapses when they had this treatment?

99% of people who had HSCT stayed free of relapses over one year.

How many people's disability didn't get worse when they had this treatment?

Disability didn't get worse over three years for 94% of the people who had HSCT.

Disability didn't get worse over three years for 40% of the people who took DMT drugs.

In MS disability is measured by something called the **EDSS scale**. The lower your score, the better.

In people who had HSCT their scores got better (dropping from 3.5 to 2.4). Those on DMT drugs got worse (going up from 3.3 to 3.9.)

The people on this trial will be followed for five years to see if these results last.

Trial two

Another trial looked at more people (151). Most had relapsing MS but 28 had secondary progressive MS.

There were good results for people with relapsing MS and who'd had it less than ten years.

Their EDSS scores were measured two years after the treatment. For half of them their scores had got significantly better, dropping by at least one on the scale. After four years this had happened for even more people (almost two thirds).

They also had fewer lesions in their brains and said their quality of life was better.

How many people stayed free of relapses when they had this treatment?

80% of people who had HSCT stayed free of relapses over four years.

How many people's disability didn't get worse when they had this treatment?

Disability didn't get worse over four years for 87% of the people who had HSCT.

HSCT didn't seem to work for the people with secondary progressive MS. It also didn't seem to work for people who'd had relapsing MS longer than ten years.

What about side effects?

Highest risk



Compared to other DMT treatments the risk of side effects, especially serious ones, is the highest.

HSCT is an aggressive treatment. In the past, out of every hundred people who had HSCT one or two died from having it.

The death rate is falling as doctors have more experience with this treatment and use a gentler form of chemotherapy. In a recent trial of over 50 people who had HSCT no one suffered very serious side effects.

Side effects might include:

- more risk of developing infections
- in women, early menopause
- infertility (not being able to have children)
- and more risk of **autoimmune conditions**, such as thyroid problems, and maybe more risk of cancer

The chemotherapy drugs at the start of the treatment make you very tired and more likely to bleed or bruise. They also cause you to have no appetite and lose your hair (but it grows back).

While your immune system rebuilds itself, you must spend three to four weeks in a hospital isolation room to protect yourself from infections. Find the latest news of HSCT at mssociety.org.uk/hsct

Questions to ask my neurologist

Talking about treatments with your neurologist or MS nurse might not come easily to you.

Time during your appointment can be short. You can go into your appointment with questions, only to realise afterwards you didn't get answers to them.

It can help to make notes beforehand of what's on your mind and to write things down during your visit.

Taking someone along with you to the appointment can also help make sure your questions get answered.

To make things easier the MS Society has made a checklist of questions you might want to ask your specialist. There's also suggestions of what to take to appointments.

You can download this **Talking about treatments** checklist at mssociety.org.uk/talkingtreatments

Or call **0300 500 8084** and ask for one to be sent to you.



Talking about treatments

Questions to ask my MS specialist



For people with relapsing MS



New words explained

‘Active’ relapsing remitting MS

– ‘active MS’ can mean different things depending on which treatment guidelines you look at. In some it means when someone has two or more **relapses** in the last two years.

For many neurologists it means when you’ve had just one recent relapse and/or if MRI scans show new signs that your MS is active (there are new or bigger **lesions**).

Association of British

Neurologists (ABN) – the professional body in the UK for MS specialists. It recommends which treatments are offered to people with MS.

Autoimmune condition – when your immune system starts to attack parts of your own body by mistake. MS is one example.

Some DMTs like alemtuzumab or HSCT can trigger autoimmune reactions, such as thyroid problems.

Clinically isolated syndrome or **CIS** – when you have a first attack of MS-like symptoms. If scans

show **lesions** on your brain, you’re likely to have a second attack, and then be diagnosed with MS. Taking a DMT can make this less likely to happen.

EDSS score – the Expanded Disability Status Scale measures how badly someone is affected by MS. It focuses on how well they can walk.

Scores start at zero for no disability or effects of MS, with nine meaning in bed all the time. Seven means a person uses a wheelchair all the time. DMTs aren’t given to people with an EDSS score of seven or higher.

First line treatments – the standard set of drugs you’ll be offered first. They have the least side effects but have less impact on MS.

If these don’t control your MS well, you’ll be given a **second line** drug, which is stronger but may have more side effects.

If this doesn’t work, you’ll be offered **third line** options. These are the most effective drugs but

with the highest risk of serious side effects.

‘Highly active’ relapsing remitting MS – when MS is this active, you’ll have had a **relapse** in the last year despite taking a DMT (beta interferons or glatiramer acetate, tecfidera and dimethyl fumarate). MRI scans show your MS is ‘active’ (new **lesions** can be seen). This also applies if you’re not on a DMT but having frequent relapses and/or MRI scans show new lesions.

‘Highly active’ means more or less the same as ‘rapidly evolving severely relapsing remitting MS’.

HSCT (Haematopoietic Stem Cell Transplantation) – cells are taken from your bone marrow. You have chemotherapy to destroy your faulty immune cells. The stem cells are put back into your body. There they help rebuild a healthy immune system that’s hopefully free of MS.

Immune system – how your body defends you against the viruses and bacteria that cause infections.

In MS this system attacks your central nervous system by mistake.

Inflammation – this is when your immune system reacts to attack or damage. It sends more blood and immune cells to the damaged area, making it swollen. MS causes inflammation of nerves in your brain and spinal cord. Unless this inflammation is treated, this damages the nerves, leading to symptoms of MS.

Lesions (also called ‘plaques’) – areas of damage in your brain or spinal cord caused by MS. They slow down or stop messages travelling down nerves. This affects your control of parts of your body. Lesions can be seen on MRI scans.

MRI scans – pictures of your brain or spinal cord made by ‘magnetic resonance imaging’. They show where MS is causing inflammation and damage to the **myelin** around the nerves.

Myelin – a fatty covering around your nerves that becomes damaged by your immune system when you have MS. This damage interrupts messages that travel along your nerves, causing symptoms of MS.

National Institute for Health and Care Excellence (NICE) – NICE is part of the Department of Health but independent from it. NICE produces guidelines for England and Wales on which drugs should be available on the NHS and how they should be used.

Nerves – bundles of fibres along which signals travel from your brain or spinal cord. These signals control how parts of your body work and move, including your thinking and memory.

Neutralising antibodies – antibodies are made by your immune system to help kill viruses and bacteria. Sometimes your immune system makes ‘neutralising antibodies’ against some MS drugs. This means they won’t work as well and you might need to switch to a new drug.

Progressive multifocal leukoencephalopathy (PML) – a rare but serious brain infection. Some DMTs (mostly natalizumab) carry a risk of PML. You’re most at risk if you have the JC virus, a common infection that our immune system normally keeps under control. This virus

can become active when some MS drugs cause changes to our immune system. PML can cause serious disability. Up to one in four who get it can die.

Rapidly evolving severe relapsing remitting MS – when MS is very active. Someone will have two or more disabling **relapses** in one year and two MRI scans will show more or bigger **lesions**. It means more or less the same as ‘**highly active relapsing remitting MS**’.

Relapse – a flare up or attack of your MS when you get new symptoms or old ones get worse. Symptoms then go away, get less noticeable or they can become permanent.

Further information

Resources

You can get more detailed information on each drug in this booklet in our DMT factsheets at **mssociety.org.uk/dmts**

You'll find more on stem cell transplantation at **mssociety.org.uk/hsct**

Our award winning information resources cover every aspect of living with MS.

To order them email **shop@mssociety.org.uk** or visit **mssociety.org.uk/publications**

MS Helpline

The freephone MS Helpline offers confidential emotional support and information for anyone affected by MS, including family, friends and carers.

Information is available in over 150 languages through an interpreter service.

0808 800 8000
(closed on weekends and
bank holidays)
helpline@mssociety.org.uk

About this resource

With thanks to all the people affected by MS and professionals who contributed to this booklet.

If you have any comments on this information, please send them to: resources@mssociety.org.uk

Disclaimer: We have made every effort to ensure that the information in this publication is correct. We do not accept liability for any errors or omissions. Availability and prescribing criteria for drugs in various parts of the UK may change. Seek advice from the sources listed.

References

A list of references is available on request. Call **0300 500 8084**.

Photography

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This resource is also available in large print.

Call **0300 500 8084**
or email shop@mssociety.org.uk

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