Disease modifying therapies (DMTs) for MS
The Multiple Sclerosis Society

More than 100,000 people live with multiple sclerosis in the UK. Every one of them shares the uncertainty of life with MS.

We’re funding research and fighting for better treatment and care to help people with MS take control of their lives.

With your support, we will beat MS.

The MS Society provides this information free of charge but if you would like to help cover the cost, which will help towards our essential work, please call 0800 100 133 or visit the fundraising section of our website to make a donation. Anything you can give will be greatly appreciated.
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Disease modifying therapies (DMTs) are used to treat types of multiple sclerosis (MS) where you have relapses.

DMTs can reduce inflammation, slow down damage caused by MS that builds up (accumulates) over time and can lower the number or severity of relapses you may have. They offer people with MS the chance to take greater control of their condition and their lives.

Unfortunately, they can’t help people who have a non-relapsing type of MS.

About this booklet

Because many people consider taking DMTs soon after – or even before – being diagnosed with MS, this booklet starts with a short description of MS.

Next we explain what DMTs are and how to go about making important decisions, such as which DMT seems best for you.

Then we give basic facts about each drug, explaining who they’re for, how you take them, and their benefits and side effects.

Sometimes the language used about MS is new or confusing. Where a word is in bold it means you can turn to the back of the booklet and find it explained.

This booklet has only basic information about each DMT. For more on each drug, check out our downloadable factsheets for each DMT from our website at www.mssociety.org.uk/earlytreatment
What is MS?

In order to understand why DMTs are so crucial, it’s important to understand what’s happening in MS.

Your body’s immune system fights off infections but in MS it mistakenly attacks parts of your brain and spinal cord (which together make up your central nervous system). It attacks the covering (called myelin) around your nerves. This interrupts the signals from your brain that tell other parts of your body what to do, causing the symptoms of MS.

MS is a very individual condition; no two people are affected in the same way. The symptoms you’ll have will depend on which part of your central nervous system is affected.

With MS damage to your central nervous system can be building up over time even when no relapses are happening (during periods of remission), as well as during a relapse.

A relapse is also known as an ‘attack’, ‘exacerbation’, ‘flare up’, ‘acute episode’ or ‘clinical event’. It’s when you experience new symptoms or old symptoms get worse and it’s one sign of this damage. But if you don’t have relapses this doesn’t mean your MS must be inactive.

In early stages of MS your body can naturally repair some of this damage. As time goes on, your body loses the ability to repair the damage.

“[When my consultant first prescribed my DMT, I was only just getting my head round the fact that I’d got MS. I didn’t think to ask anything about the drugs, because at that early stage it’s hard to know what to ask. I’d recommend getting hold of some written information before that first appointment, so you can work out what you’d like to discuss with your consultant.” Louisa

www.mssociety.org.uk
What is MS?

This leads to a build-up of disability (often called ‘accumulation of disability’).

Most of the damage being done isn’t visible and you don’t have noticeable symptoms.

DMTs work by slowing the damage MS causes. How each DMT does this differs slightly. DMTs can help people who have relapses, but unfortunately they’ve not been found to help people who don’t have them.

Find out more about MS at www.mssociety.org.uk/what-is-ms

“I’d love people who’ve just been diagnosed with 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 all the time.”

Lorraine
Disease modifying therapies (DMTs) are also called ‘disease modifying drugs (DMDs).

In types of MS where you have relapses they can reduce inflammation, slow down damage caused by MS that builds up (accumulates) over time and can lower the number of relapses you may have or how serious they are.

This means that people who take a DMT are more likely to see a slow down in how their disability gets worse. The evidence shows that DMTs work better the earlier you start taking them.

There are now 11 DMTs we can use for MS. They’re all different in how well they work, their side effects and how you take them. As a general rule, the more effective treatments tend to have more severe potential side effects.

Each DMT has two names;  
• its ‘generic’ name. This is the actual name of the drug  
• its brand name. This is the name given to it by the company who makes it

In this booklet we use the generic names, sometimes giving brand names in brackets.

DMTs can be grouped into three broad types, according to how well they work:

**Moderate**
(they can work fairly well):
• glatiramer acetate (Copaxone)  
• five different beta interferons (Avonex, Betaferon, Extavia, Plegridy and Rebif)  
• teriflunomide (Aubagio)

**Good**
(they can work well):
• dimethyl fumarate (Tecfidera)  
• fingolimod (Gilenya)

**High**
(they can work very well):
• alemtuzumab (Lemtrada)  
• natalizumab (Tysabri)
What are DMTs?

How do DMTs work?
DMTs work by stopping the immune system from attacking the central nervous system so badly. This reduces some of the inflammation and damage that MS causes. How each DMT works is different and people respond to them differently. It’s not clear why they work only for people who are having relapses, or why people have such different responses.

Possible benefits of DMTs
DMTs don’t cure MS, but they offer several possible benefits. You might:

- have fewer relapses
- have relapses that aren’t as severe
- delay your disability getting worse
- reduce the build-up of damage inside your brain (called ‘plaques’ or ‘lesions’), as measured with MRI scans of your brain

DMTs can’t undo any permanent disability you already have.

You can find out more about how much, on average, each drug reduces numbers of relapses and how fast people’s disability gets worse (‘disability progression’) on pages 19 to 31.

It’s important to know, though, that there can be big differences from person to person in how well each drug works. And we must be careful when comparing how DMTs do in various trials. Often we can’t directly compare results from one trial to another as trials can be very different from each other.

The benefits of starting treatment early
Evidence shows that DMTs work better the earlier you start taking them.

Damage caused by MS builds up over time. So the earlier you begin treatment, the less damage will have built up before the treatment starts to take effect.

How early is early treatment?
The Association of British Neurologists (ABN) updated their guidance on how MS should be treated in 2015.
They recommend treatment starts as close to diagnosis as possible. In order to do this, they state that you should have a six-week follow-up appointment after you’re diagnosed. They also recommend regular reviews with a neurologist who specialises in MS and that MRI scanning is used as part of this review process.

MRI scans are the most accurate way of seeing how active your MS is. Together with the check ups that your MS specialist gives you, MRI scans will help in decisions about which treatment option is right for you. Which treatment to take should be something that you and your specialist decide together.

The NICE guidelines also recommend that your specialist should talk to you about treatment with a DMT if you’re diagnosed with a relapsing type of MS.

As part of these discussions your MS should be monitored by using MRI scans, the clearest way of seeing how active your MS is, and by the check ups your specialist gives you.

You and your specialist should decide together what you want from your treatment and which treatment could be right for you. You should both look again at your decisions – normally once a year.

**Thinking about side effects**

Like all medicines DMTs can have side effects. We know more about side effects of the drugs we’ve been using for a long time than we know about the newer DMTs. Not everybody gets side effects or gets them as badly as other people might.

Different DMTs have different possible side effects. If you find the side effects are too much from one drug, you can speak to your specialist. It might be possible to change to another DMT.

We’ve listed some of the most common and most serious ones for each drug on pages 19 to 31. When thinking about which drug is right for you, it’s useful to know:

- how common the side effects are
What are DMTs?

- how serious the side effects are; some are mild and last only a short time but others can be serious, even life-threatening
- what monitoring you’ll need to check for serious side effects. Your neurologist or MS nurse will tell you what to look out for, but you may need regular tests, such as blood tests, to check for any problems
- how you might cope with the side effects; what’s bearable for one person might not seem that way to another
- how you think the possible benefits of a DMT weigh up against its possible side effects. People’s attitude to risk varies; some people may be prepared to accept the chance of a particular side effect in return for possible benefits, while others may not

This information should not be used in place of advice from your health care professional as there will be factors individual to you that could affect how likely you are to get a side effect.

“On the leaflet that comes with the drug, they list every single side effect you could possibly get, but it doesn’t mean you’re going to get them. It’s the same as with a packet of paracetamol. The manufacturers have got to cover themselves. With my injections, I had flu-like symptoms only once during three to four years, and they went away as quickly as anything. It wasn’t a problem.” Louisa

“I took one of the injectables for about 11 years. I lost three days a week to flu-like symptoms. It was debilitating. The side effects were worse than the MS, but I kept taking it because it was working at keeping the MS at bay.” Lorraine
What the evidence about DMTs means for you

The findings of clinical trials tell us how large numbers of people have done on treatment. They also tell us what sort of side effects people get and how common those side effects are. They can’t tell us how you as an individual will respond to each treatment or how side effects might be for you.

How do I get DMTs?

The DMTs in this booklet are available on the NHS, although there are some differences across the four countries of the UK in who can get which drug (see the individual drug descriptions for details). DMTs can only be prescribed by a neurologist or, in some areas, by a consultant nurse. There are guidelines that your specialist will follow about which DMTs you can be offered.

In the past you usually needed to have at least two relapses in the last two years before you were given a DMT. But new guidelines in 2015 from the ABN talked about specialists also giving DMTs to people who’ve had just one relapse or who have MRI scans that show new damage (lesions). Some DMTs might only be given after you’ve tried others and they haven’t worked very well. Harder hitting drugs (with more serious side effects) are usually offered only after other drugs (with fewer side effects) fail to control your MS. But in some circumstances you can choose these harder hitting drugs from the start.

You have the right to ask for an appointment with your specialist; you don’t need to wait until you’re offered one. Depending on where you live, you might be able to book an appointment directly with them, or you can ask your GP or MS nurse to refer you.

Whether or not you’re on a treatment, you should have a care and treatment review at least once a year.
What are DMTs?

If you’re having problems getting treatment check out our Access to Medicines guides
www.mssociety.org.uk/treatmeright

If you’re not happy with how you’re being treated you have the right to ask for a second opinion. You could ask your neurologist to arrange for you to see another specialist at the same hospital.

Find out more at www.nhs.uk Search “how to get a second opinion” (include the quote marks)
Making decisions about DMTs

Taking a DMT may seem scary or you may think it’s too soon to worry about it. You might even think the decision is too complicated and you’ll ‘wait and see’ what happens.

Be aware that not taking a DMT can mean your MS gets much worse in the long run. It’s not only treatment that has risks. Leaving your MS untreated has risks too. So it’s important to consider that as well, especially given the evidence that early treatment is likely to be more effective.

How do I decide?
You need to get hold of the best available information and evidence and spend time with someone who can help you understand what you need to know.

It’s best to make decisions about DMTs together with your neurologist and, if you have one, MS nurse.

Talking to your GP, friends and family and other people with MS might also help you think things through. That way you can feel you’re making the right decision for you, given the evidence we have.

Your MS nurse or neurologist can explain things and help you think things over. Don’t forget you can ask for a second opinion; details are on page 10.

“My consultant gives me a brief overview of things then hands over to my nurse. She spends more time with me, discussing things and providing almost all the information I need. She’s well informed, with lots of experience, and is very clued in.” Shirlee

“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
Making decisions about DMTs

For guidance and information about deciding about treatment you can get in touch with:
MS Helpline
Freephone 0808 800 8000 (weekdays 9am-9pm)
Or email
helpline@mssociety.org.uk

You can also use **MS Decisions**, an online tool from the MS Trust. It can help you learn about DMTs, weigh up your treatment options, get more from your discussions with your MS team and make the choice that works for you.

Visit [http://mstrust.org.uk/ms-decisions](http://mstrust.org.uk/ms-decisions)

Want to hear what other people have to say about treatment and various DMTs? Check out our online forum at

[http://community.mssociety.org.uk/forum](http://community.mssociety.org.uk/forum)

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### Deciding which DMT seems best for you

Different DMTs suit different situations. Your specialist can explain which DMTs might be best for you.

Your options will depend on what your MS is like – particularly how many **relapses** you’ve had in the last year or two, how severe they were, whether you’ve already tried another DMT and how active your MS is.

The **ABN** recommend that **MRI scanning** is used to see how active your MS is. Together with your check ups with your MS specialist this will help decide which treatment would be the right one.

An **MRI scan** can show areas of damage in your central nervous system and will allow your specialist to see when the damage happened and whether another attack is likely.

If you have a choice between a few different drugs, it may not be easy to tell which one seems best.
As well as how well the drug works and any side effects, you might want to think about:

- how treatment would fit into your lifestyle
- how you take the DMT. Some are tablets, some you inject yourself, and some are infusions (drips) given in MS clinics
- how often you take the DMT (for example, some are kept in the fridge)
- how easy it is to travel with the DMT. Special arrangements are needed to fly with needles, or drugs that need to be kept in the fridge, for example
- how often you need to visit the MS clinic for review appointments and tests

You may need blood or urine tests, for example, or an eye examination to check for side effects

- which DMT may be suitable for you if you plan to start a family

For guidance and information about deciding about treatment you can get in touch with:

- MS Helpline
  Freephone 0808 800 8000 (weekdays 9am-9pm)
  Or email helpline@mssociety.org.uk

And there’s the MS decisions online tool from the MS Trust mentioned on page 12.

“When considering a DMT, you need to 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
Making decisions about DMTs

How you take DMTs

Tablets – Some DMTs are tablets that you take by mouth.

Infusions – If you choose a DMT that’s given through an infusion (a drip), you will need to go to hospital for your treatment. This might mean an overnight stay.

During the infusion, the DMT is slowly pumped into your bloodstream through a needle that goes into a vein in your arm or leg. People normally sit in a chair or lie on a bed during their infusion. It takes one to four hours, depending on which DMT you’re taking.

Injections – Some DMTs are injected. You can learn how to give yourself your injection, or you could ask a friend or a relative to do it for you.

Many people who were afraid of needles find they soon get used to their injections. The equipment that you’re given means you don’t need to see the needle going in. Often the action of injecting just means clicking on a ‘pen’ that holds the syringe against your skin.

Your MS nurse or another member of your health care team can help you to get good at injecting. This should help cut down the chance of side effects (such as infections) on the skin around where you inject.

“Fitting injections into my lifestyle was fine. I used to do it when I got in from work, just after tea. It was very easy, because I used one of the little pens. It’s painless.” Louisa

“I had a serious phobia of injections, but I’ve been injecting myself for years now. If you’re worried, I’d recommend being honest with yourself. Say, ‘This is going to hurt but it will only be for a little minute,’ like nurses tell children. And I know you shouldn’t, but at first I used to I allow myself a treat, like chocolate.” Shirlee
Choosing when to start DMT

When to start taking your DMT is another important thing to think about and to talk over with your health care team.

There’s evidence that early treatment with a DMT can be more help to people in the long run. This means that for someone with a relapsing type of MS starting treatment sooner after being diagnosed could be better for them in the long term. While evidence shows that early treatment is best, taking a DMT later is still better than not taking one at all.

If you haven’t started a treatment yet, it doesn’t mean DMTs won’t be any good to you.

Sticking with your treatment

DMTs are designed to be used long-term. Some people find it hard to keep taking their medication. There might be several reasons, for example:

‘I don’t feel any better now I’ve started taking my DMT. So is it working?’

DMTs work behind the scenes, inside your body, to help stop some of the damage to your central nervous system that causes MS symptoms. This damage can be happening even when you don’t have any noticeable symptoms, including relapses, and DMTs can help slow it down. Some people notice benefits straight away, while others don’t. But that doesn’t necessarily mean the treatment isn’t working.

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

It may help to know that some of the side effects of DMTs tend to wear off with time. If you have an MS nurse they can often help with managing side effects. If side effects are too much, you can speak to your specialist. It might be possible to switch treatments.
Making decisions about DMTs

‘Even though I’m taking my DMT I’ve had a relapse’
DMTs can cut the number of relapses you get but they might not stop them altogether. And it can take several months before you get the maximum protection from a drug. So a relapse might happen before then.

DMTs are not designed just to stop relapses – they’re taken to slow down the damage MS causes to your central nervous system. MRI scans show that plaques or lesions can appear whether or not you’ve had a relapse.

‘I just forget to take my DMT’ or ‘I get bored of taking it’
DMTs work best when you follow your specialist’s instructions on how to take them. It’s best to be honest and open about any difficulties you’re having with sticking to treatment. A lot of people find it hard. Your GP, MS nurse and neurologist can all help.

‘There are too many tests’
Some of the DMTs, especially the more effective treatments, can have unpleasant side effects. These can be managed or treated if caught in time. Before you start a treatment, the tests you’ll need will be discussed with you. If you feel it’s too much, you can speak to your specialist about whether it’s possible to switch treatments.

Looking again at your decisions
You may need to look again at your decisions about DMTs with your health care team on a regular basis. If you decide not to take a DMT you can change your mind later. If you’re already taking one, your specialist may talk to you about switching to another DMT if one’s available to you. This can help if:

- you find you can’t put up with side effects or they’re really serious
- you have relapses just as often and as serious as before you started the DMT – or they’re happening more often and are more serious
- you develop neutralising antibodies (see page 34)
- a treatment comes along that’s better for you
- you’re finding it difficult to keep taking your DMT as you should
• you have an allergic reaction to the drug you’re taking
• MRI scans show new areas of damage (plaques or lesions) in your brain or spinal cord

You usually need to try a drug for at least six months before switching to another, except if you have an allergic reaction. But it’s your right to ask about different treatment options if you don’t feel that the one you’re on is right for you.

**Stopping treatment**

If your specialist suggests you stop taking your DMT, you have the right to ask why. Often it’s because your MS has changed to non-relapsing secondary progressive MS and your disability levels keep getting worse.

DMTs only work on relapsing forms of MS. Once the **inflammation** phase linked with relapses fades, they can no longer help. **MRI scans** can be used to help tell whether or not your MS is still causing the damage that’s caused by inflammation.

**Emotional effect of stopping treatment**

For some people a DMT can provide a form of emotional support and a feeling of ‘doing something’. Those treatments that involve going into hospital for an infusion also bring you into contact with others with MS, providing a sense of community and support.

Stopping treatment can feel like a significant milestone, with some people feeling depressed or even hopeless. This could be because they’re worried their MS will now get worse (or it has got worse), or because they’re losing their support group; perhaps both.

The MS Society forum is a great place to get support from others who’ve had a similar experience. Or you can contact our helpline if you want to talk about how you feel.

![Helpline Icon]

If you want to talk to someone about how you feel about stopping treatment or changes to your MS you can call MS Helpline

**Freephone 0808 800 8000** (weekdays 9am-9pm)
What if I can’t take a DMT?

Some people can’t take DMTs. This includes people with progressive MS who aren’t having relapses, or who have MRI scans that don’t show new or bigger lesions, or women who are trying for a baby, are pregnant or breast feeding.

There might be other reasons why you can’t take DMTs. Your specialist will check this by asking you about any other health problems you’re having and any other medicines you’re taking. You might also need to have some tests.

If you’re not taking a DMT, there are still ways to manage the different symptoms of your MS. Medications can be helpful, as can other approaches such as physiotherapy. You can also have treatment for relapses.

Making decisions about DMTs

Or email helpline@mssociety.org.uk
Or check out our online forum at http://community.mssociety.org.uk/forum

Trying for a baby, pregnancy and breast feeding

If you’re trying to have a baby, you’re pregnant or breast feeding, it’s important to discuss all your medications with your doctor. Women in these situations are advised to stop taking DMTs.

Before you start trying for a baby, it’s important that levels of DMT in your body have dropped. The time needed – sometimes called the ‘washout period’ – is different from drug to drug.

Women who’ve just given birth have a bigger chance of having a relapse. That’s why the ABN recommends restarting a DMT soon after the baby’s born, but not if you’ll be breast feeding the baby.

Men with MS who would like to father a child should also talk to their doctor about their medication. Studies so far have found no evidence of any major harm to a man’s sperm linked to taking DMTs, but data is limited.
Profiles of each drug

Pages 20 to 31 have brief profiles in alphabetical order of each individual DMT.

You’ll find basic information on who they’re for, how they work and how you take them. There’s also information about possible benefits and some (but not all) of the possible side effects.

We’ve included some of the more common or serious side effects which affected people who took the drugs in the clinical trials. But it’s important to understand that like all side effects with medicines, not everybody will get them.

Your MS nurse or neurologist can discuss these with you and suggest ways to manage and hopefully overcome them.

For full lists of all the side effects of a drug, you can check the European Medical Council website below. It’s the same information that you get inside a medicine packet.

www.medicines.org.uk/guides

Who can have each DMT?
In the pages that follow we describe who can take each drug. This is mostly based on what is written in the 2015 guidelines of the ABN. These are the most up to date guidelines on treating MS and tend to be less restrictive than other, older guidelines.

In the past to be given a DMT you usually needed to have ‘active MS’, defined as at least two relapses in the last two years. But more and more neurologists are defining ‘active MS’ as people who’ve had a recent relapse and/or have signs on their MRI scans that their MS is active. In the following pages we use this newer definition when we answer questions about who can take the different DMTs.
Profiles of each drug

Alemtuzumab
Brand name Lemtrada; also known in the past as CAMPATH-1H

Who can take it?
- People with relapsing remitting MS who have had a relapse in the last year and MRI scans show new signs that their MS is active (new lesions) despite taking another DMT
- Alemtuzumab can be used more widely as a person’s first DMT. But this is only if they’ve had a recent relapse and/or MRI scans show new signs that their MS is active (new lesions). In these cases it can be used whether people have tried another DMT or not

How it works
Alemtuzumab was originally developed to treat certain types of cancers of the immune system. It binds to and kills certain immune cells (white blood cells), stopping them from entering the brain and attacking the myelin covering around the nerves that protects them.

How it’s taken
Most people have two courses of treatment spaced a year apart from each other. Alemtuzumab is given through a drip (known as an infusion) in hospital.

For the first course you go to hospital 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 the length of the treatment.

You have the second course a year later, over three days in a row, again for about four hours each day.

For some people a third (or even fourth) course is needed. Again, this will be over three days in a row, for about four hours each day.

How effective is alemtuzumab?

High
Relapses dropped by: 50-55% compared to beta interferons
This means that in trials, on average, people saw a 50-55% drop in the number of relapses they had (compared to people who took beta interferons).

Disability getting worse was slowed down by: 42% compared to beta interferons
This means that in trials, on average, people saw a 42% drop in the risk of their disability getting worse (compared to people who took beta interferons).

But in one trial, people taking alemtuzumab didn’t see a significant drop in the risk of their disability getting worse.

What are the possible side effects?
Some of the more common side effects are headaches, rash, feeling sick, hives (a skin rash), fever, itching, not being able to sleep and fatigue. Other side effects include chest infections, urinary tract infections, cold sores and sinusitis (inflammation in the spaces around your nose).

Thyroid problems
There’s also a common and more serious side effect reported with alemtuzumab: developing an overactive or underactive thyroid. This is treatable but requires lifelong medication.

ITP
There’s also a very small risk of developing a blood clotting disorder known as ITP (immune thrombocytopenia). It’s potentially very serious but treatable if it’s caught early by a blood test.

Everyone taking alemtuzumab will be monitored for problems relating to the thyroid and ITP. Your health care team should also tell you what to look out for and what to do if you notice any signs or symptoms of either problem.
Beta interferons
Also known as interferon betas

Five of the DMTs are beta interferons. They have the following brand names:
- Avonex
- Betaferon
- Extavia
- Plegridy
- Rebif (two doses available)

They’re all similar in how effective they are, but they differ in how you prepare, inject and store them.

Who can take them?
- People with relapsing remitting MS who’ve had a recent relapse and/or if MRI scans show new signs that their MS is active (new lesions)
- People with secondary progressive MS who still have significant relapses
- It’s possible beta interferon can make depression worse, so you might not be prescribed one if you’ve had depression in the past

How they work
Interferons are proteins produced naturally in the human body that help fight viral infections. It’s thought that beta interferons can reduce (and might prevent) inflammation, which can damage nerves in MS.
### How they’re taken

They’re all injected.

<table>
<thead>
<tr>
<th>Drug</th>
<th>How Taken</th>
<th>Supplied As</th>
<th>How Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avonex</td>
<td>Injected into the muscle.</td>
<td>Supplied as either a pre-filled syringe or a powder, to be mixed before injection</td>
<td>Once a week</td>
</tr>
<tr>
<td>Betaferon</td>
<td>Injected under the skin</td>
<td>Supplied as a powder, to be mixed before injection</td>
<td>Every other day</td>
</tr>
<tr>
<td>Extavia</td>
<td>Injected under the skin</td>
<td>Supplied as a powder, to be mixed before injection</td>
<td>Every other day</td>
</tr>
<tr>
<td>Plegridy</td>
<td>Injected under the skin</td>
<td>Supplied as a pre-filled pen</td>
<td>Every two weeks</td>
</tr>
<tr>
<td>Rebif</td>
<td>Injected under the skin</td>
<td>Supplied as (1) pre-filled syringe or (2) the RebiSmart electronic injection device</td>
<td>Once a day or three times a week (depending on the dose)</td>
</tr>
</tbody>
</table>

### How effective are beta interferons?

![3 green circles](https://www.mssociety.org.uk) **Moderate**

**Relapses dropped by: 33%**

This means that in trials, on average, people saw a 33% drop in the number of relapses they had (compared to people who didn’t take these drugs).

**Disability getting worse was slowed down by: a modest amount**

This means that in trials, on average, people saw a modest drop in the risk of their disability getting worse (compared to people who didn’t take these drugs).
Long-term evidence shows beta interferons have a much greater effect than ‘modest’ if used early in the course of MS.

What are the possible side effects?
Some people find that after the injection they feel like they have flu, with symptoms such as headaches, muscle aches, chills or a fever.

These usually last for no more than 48 hours after the injection and often get better the longer you use the drug.

If you’re taking one of the drugs that are injected under the skin, problems such as reddening, hardening, bruising or itching of the skin can happen where you inject.

Profiles of each drug

Dimethyl fumarate
Brand name Tecfidera; also known as BG-12

Who can take it?
- People with relapsing remitting MS who’ve had a recent relapse and/or if MRI scans show new signs that their MS is active (new lesions).

If you’re taking an oral contraceptive (the pill) dimethyl fumarate may affect how well it works. So you may need to speak to your GP about other forms of contraception.

How it works
We don’t know exactly how it works, but studies show it has an anti-inflammatory effect. This may be helpful in reducing the inflammation that causes damage in the brain and spinal cord of people with MS.

How it’s taken
Tecfidera is a tablet that’s taken twice a day.
Although the risk is extremely small it’s important to be aware of it as PML can be fatal. As of August 2015 only two cases have been seen in over 100,000 people across the world taking dimethyl fumarate.

There are some factors that are known to increase your risk of developing PML. Your specialist can tell from a blood test if you’re at risk. If you are your health care team should tell you what to look out for and what to do if you notice signs of PML.

Profiles of each drug

How effective is dimethyl fumarate?

Good

Relapses dropped by: 53%
This means that in trials, on average, people saw a 53% drop in the number of relapses they had (compared to people who didn’t take this drug).

Disability getting worse was slowed down by: 38%
This means that in trials, on average, people saw a 38% drop in the risk of their disability getting worse (compared to people who didn’t take this drug).

What are the possible side effects?
The most common side effects are flushing and feeling hot, diarrhoea, feeling sick, stomach pain and headache.

PML: a very rare side effect
Being treated with dimethyl fumarate can increase your chances of developing a rare viral brain infection called PML (progressive multifocal leukoencephalopathy).
Profiles of each drug

Fingolimod
Brand name Gilenya

Who can take it?
Whether you can get fingolimod is different in the four nations of the UK.

In England:
- People who have the same or an increased number of relapses despite treatment with interferon betas (Avonex, Rebif, Betaferon, Extavia) or glatiramer acetate (Copaxone)
- People who are currently on natalizumab (Tysabri) and are at high risk of developing PML can be switched to fingolimod

In Scotland:
- People with highly active relapsing remitting MS who have failed to respond to a DMT
- People who have had two or more disabling relapses in one year, and an increase in lesions as shown on an MRI scan

In Wales and Northern Ireland:
- People who have the same or an increased number of relapses despite treatment with interferon betas (Avonex, Rebif, Betaferon or Extavia)

Across the UK:
The most recent ABN guidance suggests that fingolimod can also be used as the first drug treatment for people with highly active relapsing remitting MS.

How it works
A special type of immune cell, called a T-cell, is thought to be responsible for much of the damage caused in relapsing remitting MS. T-cells are a kind of white blood cell (or ‘lymphocyte’) that fight off infections but in MS they start to damage your nerves. Fingolimod acts by trapping these T-cells in the lymph nodes. This stops many of them getting into the brain and spinal cord where they would cause damage to the protective myelin covering around the nerves.

How it’s taken
Fingolimod is a tablet that’s taken daily.
How effective is fingolimod?

Good

Relapses dropped by: 54%
This means that in trials, on average, people saw a 54% drop in the number of relapses they had (compared to people who didn’t take this drug).

Disability getting worse was slowed down by: 30%
This means that in trials, on average, people saw a 30% drop in the risk of their disability getting worse (compared to people who didn’t take this drug).

What are the possible side effects?
Some of the more common side effects include headache, diarrhoea, back pain, cough and more chance of getting infections like colds or flu.

When you take the first dose of fingolimod it can cause your heart rate to temporarily slow down or to beat irregularly. Because of this, you’re given your first dose of fingolimod in hospital and monitored for at least six hours after taking it to check for any problems.

PML: a very rare side effect
Fingolimod is used by people who were switched from another drug, natalizumab, because of the risk of getting a rare viral brain infection called PML (progressive multifocal leukoencephalopathy).

But there’s also an extremely small risk of PML when you take fingolimod too as it also makes your immune system work less well. It’s important to be aware of this very small risk because PML can be fatal. As of August 2015 only three cases of PML have been seen in over 125,000 people across the world taking fingolimod.

There are some factors that are known to increase your risk of developing PML. Your specialist can tell from a blood test if you’re at risk. If you are your health care team should tell you what to look out for and what to do if you notice those signs.
Profiles of each drug

Glatiramer acetate
Brand name Copaxone

Who can take it?
• People with relapsing remitting MS who’ve had a recent relapse and/or if MRI scans show new signs that their MS is active (new lesions)
• People with secondary progressive MS who still have significant relapses

How it works
It’s not clear exactly how glatiramer acetate works, but it seems to attach itself to the immune cells that target the protective myelin sheath around nerves, and stops them causing damage.

How it’s taken
The drug was injected under the skin every day using a pre-filled syringe but now you can inject just three times a week.

How effective is glatiramer acetate?

Moderate

Relapses dropped by: 33%
This means that in trials, on average, people saw a 33% drop in the number of relapses they had (compared to people who didn’t take this drug).

Disability getting worse was slowed down by: a modest amount
This means that in trials, on average, people saw a modest drop in the risk of their disability getting worse (compared to people who didn’t take this drug). Although in one trial there was no difference between this drug and dimethyl fumarate.

What are the possible side effects?
Some of the more common side effects include reddening, hardening, bruising or itching of the skin where you inject. Less often people can also feel sick, get headaches or feel weak.
Natalizumab
Brand name Tysabri

Who can take it?
• People with relapsing remitting MS who have had a relapse in the past year and MRI scans show new signs (lesions) that their MS is active despite taking another DMT
• People with relapsing remitting MS who – whether or not they’ve been taking another DMT – have at least two relapses in the last year and MRI scans show new signs (lesions) that their MS is active

How it works
Natalizumab is an antibody, like those found naturally in your immune system which fight off infections. By attaching itself to certain immune cells, natalizumab prevents these cells from leaving the blood stream and entering the brain and spinal cord, where they can cause inflammation and damage.

How it’s taken
Natalizumab is given through a drip (known as an infusion), which takes about an hour. You need to go to hospital once every four weeks for the infusion, but you don’t need to stay overnight.

How effective is natalizumab?

● ● ● High

Relapses dropped by: 68%
This means that in trials, on average, people saw a 68% drop in the number of relapses they had (compared to people who didn’t take this drug).

Disability getting worse was slowed down by: 42%
This means that in trials, on average, people saw a 42% drop in the risk of their disability getting worse (compared to people who didn’t take this drug).

What are the possible side effects?
Common side effects include joint pain, fever, tiredness, a runny or blocked nose, sore throat, feeling or being sick, headache or dizziness.
Profiles of each drug

PML
Being treated with natalizumab can increase your chances of developing a rare viral brain infection called **PML (progressive multifocal leukoencephalopathy)**. Although the risk is small in the first two years – at around 1 in 500 people treated with natalizumab – the risk in some people can go up a lot as time goes on.

By late 2014 around 500 people taking natalizumab had developed PML (out of over 130,000 people across the world taking this drug).

It’s important to be aware of PML as it can be fatal.

Everyone taking natalizumab will be monitored to check for the early signs of PML. Your health care team should also tell you what to look out for and what to do if you notice those signs.

There are some factors that are known to increase your risk of developing PML. Your neurologist should talk to you about those risk factors and how they affect you.
**Teriflunomide**  
Brand name Aubagio

**Who can take it?**  
- People with relapsing remitting MS who’ve had a recent relapse and/or if MRI scans show new signs that their MS is active (new lesions).
- It is not approved for treating highly active or rapidly evolving relapsing remitting MS.

**How it works**  
The exact reason why teriflunomide works in MS is not fully understood. But it’s thought to affect the **immune system** by blocking the action of a specific set of immune cells called T-cells. These white blood cells (lymphocytes) fight off infections but in MS they are thought to be responsible for causing damage to the brain and spinal cord.

Teriflunomide doesn’t affect other cells in the immune system, so the body is still able to fight off infections.

**How it’s taken**  
Teriflunomide is a tablet that you take once a day.

**How effective is teriflunomide?**

- **Relapses dropped by: 30%**
  This means that in trials, on average, people saw a 30% drop in the numbers of relapses they had (compared to people who didn’t take this drug).

- **Disability getting worse was slowed down by: 30%**
  This means that in trials, on average, people saw a 30% drop in the risk of their disability getting worse (compared to people who didn’t take this drug).

**What are the possible side effects?**

Common side effects may include feeling sick, headaches, diarrhoea, and hair thinning or loss.
Questions to ask your MS specialist

Which DMTs can I have for my type of MS?

How much difference might a DMT make to my MS?

Why might some DMTs not be available to me?

What are the side effects and risks of different drugs?

How likely am I to get side effects? What help would I get?

How do people take the various DMTs?

What tests do I need before and during this treatment?

Do they hurt?

Is it OK to be on treatment if I want to have a baby/become a dad?

If I say no to a DMT now can I change my mind and have one later?

And of course any questions of your own!
New words explained

Association of British Neurologists (ABN) – the professional body for neurologists (specialists in conditions which affect the nerves such as MS). The ABN recommends which treatments are offered to people with MS

‘Active’ relapsing remitting MS – until recently ‘active MS’ was used for someone had two or more relapses in the last two years. Neurologists more and more are including under ‘active MS’ people who’ve had just one recent relapse and/or if MRI scans show new signs their MS is active (with new lesions)

Central nervous system – your brain and spinal cord (from here nerves carry messages that control how most parts of your body work)

Disability progression – how MS moves from one stage to another. How disabled you are gets worse at each stage

‘Highly active’ relapsing remitting MS – when someone has a relapse in the last year despite taking interferons or glatiramer acetate and MRI scans show their MS is active (new lesions can be seen). This also applies to someone if they’re not on a DMT but having frequent relapses and/or new lesions are seen on their MRI scans

Immune system – how your body defends you against infections or diseases. In MS this system goes wrong and it attacks your central nervous system

Inflammation – when your immune system reacts to attack or damage it sends more blood and immune cells to the damaged area, making it swollen. When inflammation of the brain and spinal cord is left untreated it starts to damage it, leading to MS symptoms
New words explained

Lesions (see also plaques) – areas of damage caused by MS in your brain or spinal cord. They interrupt or stop messages travelling down nerves, affecting your control of parts of your body. Lesions can be seen on MRI scans.

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

Myelin – a fatty covering that protects parts of your nerves. When you have MS myelin is attacked by mistake by your immune system. This disrupts messages that travel along your nerves and that control parts of your body, causing the symptoms of MS.

Nerves – bundles of fibres along which signals travel from your brain or spinal cord. These nerve signals control how parts of your body work.

Neutralising antibodies – antibodies are made by your immune system to kill off viruses and bacteria that get into your body. Some people find their immune system makes ‘neutralising antibodies’ against some MS drugs. Over time this stops a drug working like it should and you might need to switch to a new one.

National Institute for Health and Care Excellence (NICE) – a Department of Health body covering the NHS in England and Wales. It produces guidelines on which drugs, including MS treatments, should be available on the NHS and how they should be used.

Plaques (see also lesions) – areas of damage caused by MS in your brain or spinal cord. They interrupt or stop messages travelling down nerves, affecting your control of parts of your body. Plaques can be seen on MRI scans.
Progressive multifocal leukoencephalopathy (PML) – a rare but serious (sometimes fatal) infection of the brain. Some MS drugs (mostly natalizumab) can put people at risk of PML. People most at risk are those who have the JC virus, a common infection that our immune system normally keeps under control. It can become active when some MS drugs cause changes to our immune system. PML can cause death or serious disability

Rapidly evolving severe relapsing remitting MS – when someone has two or more disabling relapses in one year and evidence of increasing lesions on two consecutive MRI scans

Relapse – an attack or flare up of your MS when you get new symptoms or old ones get worse. Symptoms then go away or get less noticeable
Further information

**Library**
For more information, research articles and DVDs about MS, contact our librarian.

- 020 8438 0900
- librarian@mssociety.org.uk
- www.mssociety.org.uk/library

**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 (weekdays 9am-9pm)
- helpline@mssociety.org.uk

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

- 020 8438 0999
- shop@mssociety.org.uk
- www.mssociety.org.uk/publications
There are a number of different sources of further support and information to help you in managing your employee with MS.

Occupational health services can help assess what reasonable adjustments your employee may need. Many larger companies have access to an occupational health service. If you don’t, you can contact Fit for Work in England Scotland and Wales.

In Northern Ireland, there isn’t a specialist occupational health service, but you can contact the Disability Employment Service for advice.

Fit for Work (England and Wales)
0800 032 6235
fitforwork.org

Fit for Work (Scotland)
0800 019 2211
fitforworkscotland.scot

Disability employment service (NI)
Part of NI Direct, the Disability Employment Service provides support to employers to recruit and retain disabled staff. It can also help people with disabilities find employment.
028 9025 2237
des@delni.gov.uk
www.delni.gov.uk

AbilityNet’s Workplace Assessment Service can help you to find the right IT equipment to meet the needs of your employee.
0800 269 545
enquiries@abilitynet.org.uk
www.abilitynet.org.uk

Business Disability Forum
A national membership organisation for businesses, helping them to recruit and retain disabled people.
020 7403 3020

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 or you can complete our short online survey at www.surveymonkey.com/s/MSresources

A list of references is available on request, and all cited articles are available to borrow from the MS Society library (there may be a small charge).

Contact the librarian on 020 8438 0900, or visit www.mssociety.org.uk/library

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.

This resource is also available in large print and audio. Call 020 8438 0799 or email shop@mssociety.org.uk

About this resource