Beta interferons (Avonex, Betaferon, Extavia, Plegridy, Rebif)

This factsheet is about beta interferons, disease modifying therapies (DMT) for relapsing multiple sclerosis (MS). At the end of this factsheet you'll find out where you can get more information on these drugs, other drugs for MS and the benefits of early treatment.

What are beta interferons?

There are five beta interferons (or interferon betas) and they’re the oldest DMTs for MS. They’ve been used against relapsing MS since the nineties. They’re not officially recommended for use on the NHS. But many people have been getting beta interferons on the NHS since the late nineties.

In 1998 beta interferon was also shown to help people with secondary progressive MS if they still have relapses. It can also slow down how quickly someone with clinically isolated syndrome or CIS (see box) goes on to get MS.

Beta interferon is pronounced:
BEE-ter inter-FEER-on.

The drugs have these brand names: Avonex, Betaferon, Extavia, Plegridy and Rebif.

Can I have these drugs?

Beta interferons are licenced to treat ‘active’ relapsing MS, defined in guidelines as two or more relapses in the last two years. But more and more MS specialists define ‘active’ MS as one recent relapse and/or signs on MRI scans that MS is active. These signs include new ‘lesions’ (areas of damage) in your brain. Beta interferons don’t usually have serious side effects, so they’re often the first DMT you might be given. A beta interferon might only be replaced by another DMT if it fails to control your MS.

So you can take beta interferons 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’)
- secondary progressive MS and you still have significant relapses
- a clinically isolated syndrome (CIS) with MRI scans showing a high chance that you’ll go on to get MS

Beta interferons can also be given to children with relapsing MS.

Whether you’ll be offered a beta interferon depends on if you qualify for it based on guidelines used by your MS specialist. These come from the Association of British Neurologists (ABN) and the National Institute for Health and Care Excellence (NICE). It also depends on whether the NHS where you live will pay for it. NHS guidelines on this tend to follow what NICE says.

CIS

Clinically isolated syndrome (CIS) is a first attack of MS-like symptoms. If it happens again you’ll be diagnosed with MS. CIS is caused, like MS, by damage to the coating of myelin that covers nerves in your brain and spinal cord. MRI scans show if you’re likely to go on to get MS (most people do if scans show lesions on their brain).
You won’t get these drugs if:

- you’re already on another DMT that’s controlling your MS well. You can’t take more than one DMT at a time
- you have progressive MS (unless you still have relapses)

Beta interferons won’t work against primary progressive MS. They only work against secondary progressive MS if you still get relapses. But several drugs are being tested to see if they work against these non-relapsing, progressive types of MS.

You might not be able to take this drug if you have some health conditions. So tell your MS specialist your full medical history, including any other health problems and medications you’re taking.

If you’re a woman trying to have a baby, or not using contraception, you should discuss with your MS specialist the possible risk these drugs might pose to your baby if you become pregnant (see the section What side effects might I get?).

How do I take them?

Beta interferons are all injected.

You can learn how to inject yourself, or a friend or relative can give you injections. Many people afraid of needles find they get used to their injections. You don’t need to see the needle going in as injecting often means clicking on a kind of ‘pen’ that holds the syringe against your skin.

You’ll get instructions and a doctor or nurse stays with you for half an hour after you inject for the first time. Your MS nurse or someone in your health care team can teach you the best way to inject. This should cut down the chance of side effects (eg, infections) on the skin where you inject.

The leaflet these drugs come with has more information about how to inject, travelling with the drugs and injecting equipment, etc (see the section More information and support).

<table>
<thead>
<tr>
<th>DMT</th>
<th>Injected into the body</th>
<th>Formulation</th>
<th>Injection Frequency</th>
<th>Storage Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avonex</td>
<td>Injected into the muscle</td>
<td>Comes as a pre-filled syringe, automatic injecting pen or as powder that you mix before you inject</td>
<td>Once a week</td>
<td>Keep the pre-mixed version in the fridge (2–8°C). It can be kept at room temperature for up to a week before use</td>
</tr>
<tr>
<td>Betaferon</td>
<td>Injected under the skin</td>
<td>Comes as a powder that you mix before you inject</td>
<td>Every other day</td>
<td>Keep at room temperature, for up to two years</td>
</tr>
<tr>
<td>Extavia</td>
<td>Injected under the skin</td>
<td>Comes as a powder that you mix before you inject with a syringe or automatic injecting pen</td>
<td>Every other day</td>
<td>Keep at room temperature, for up to two years</td>
</tr>
<tr>
<td>Plegridy</td>
<td>Injected under the skin</td>
<td>Comes as a pre-filled syringe or automatic injecting pen</td>
<td>Every two weeks</td>
<td>Keep out of sunlight until needed. Store in a fridge between 2°C to 8°C. Don’t freeze. Warm up to room temperature before injecting. If you have no fridge keep it out of sunlight and under 25°C for no more than a month</td>
</tr>
<tr>
<td>Rebif</td>
<td>Injected under the skin</td>
<td>Comes as a pre-filled syringe, automatic injecting pen or the RebiSmart electronic injection device</td>
<td>Three times a week</td>
<td>Keep in the fridge (2–8°C), but if not possible keep at room temperature for two weeks</td>
</tr>
</tbody>
</table>
How do they work?

Your immune system fights off infections. But with MS it attacks the nerves in your brain and spinal cord by mistake. This leads to inflammation and damage, especially to the coating that covers your nerves (myelin). This damage interferes with how signals travel along these nerves. Over time this affects your control over many parts of your body and causes symptoms of MS.

Your body makes its own interferons (a protein) to dampen down the inflammation caused when your immune system has reacted to an infection. It’s thought that man-made beta interferons also reduce (and might prevent) inflammation.

How well do they work?

When DMTs, including beta interferons, are working well you have:

• fewer and less serious relapses
• fewer new or bigger ‘lesions’ (or ‘plaques’) in your brain and spinal cord (lesions can be seen on MRI scans)
• a slowdown in your disability getting worse

The effectiveness of beta interferons is classed as ‘moderate’

Relapses dropped by: 33%

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.

The figures here on relapses and disability come from a 1999 trial involving 533 people over two years, and a 2014 study of 1,512 people over two years.

Beta interferons might work much better for you than these average results - or they might not work as well.

Long-term benefits: studies lasting only two years didn’t show much impact on how fast people’s disability got worse. But a study over six years showed that beta interferons (or glatiramer acetate) do slow this down and that this effect is much bigger than ‘modest’.

Check out our factsheets on two other MS drugs, alemtuzumab and fingolimod. They have details of three trials where beta interferons are compared with these drugs. In all of them beta interferons weren’t as good at cutting relapses. In two trials beta interferons were as good as the two other drugs at stopping people’s disability getting worse but not as good in the third trial.
What side effects might I get?

Like all drugs, beta interferons can have side effects, but not everyone gets them. Not many people stop taking these drugs because of side effects.

The more effective a DMT is, the more risk of serious side effects. Beta interferons (along with glatiramer acetate) are the DMTs that are the least effective at controlling MS but have the lowest risk of serious side effects. They’ve been used for over 20 years so we know they’re by and large safe with fewer serious side effects than DMTs in general.

Impact on CIS: Beta interferons can slow down how quickly you go from a CIS to more attacks and then a diagnosis of MS. A 2013 study of nearly 2,000 people who had a CIS showed that the risk of their disability getting worse over a year fell by around a half at least if they took beta interferon. This fell even more the longer they took these drugs.

Beta interferons might harm unborn babies. If you’re a woman who might get pregnant discuss with your MS specialist using reliable contraception (eg, the ‘pill’ or condoms) while on these drugs. This is true while you’re on the drug and for about a month after you stop taking it. For more information on getting pregnant see I want a child. Can I take beta interferons?

Side effects are common when you start treatment but tend to ease off over time.

Your MS specialist, GP or MS nurse can give you advice about ways of dealing with side effects.

The most common side effects

flu-like symptoms (very common, at least one in ten people get one or more of these)
- headache, muscle aches, chills, fever, sweating, pain in your joints arms or legs and feeling tired
- these symptoms usually last for no more than 48 hours (two days) after you inject and often get better over time
- injecting immediately before going to bed
- taking ibuprofen or paracetamol can help – you may sleep through the worst of them
- drinking more fluids the day you inject might help with the headache

reactions where you inject yourself
- reddening, hardening, bruising, swelling or itching of the skin, fluid draining from where you inject, breaks in your skin, pain and your skin becoming very sensitive or changing colour
- your MS nurse can teach you good injection technique to help lessen these side effects
- you’re usually less likely to get injection reactions as time goes on
- less common is something called ‘lipoatrophy’
  - this means you lose fat in small areas under the skin where you inject
  - this leaves dents which usually don’t go away
  - the problem can be kept to a minimum by looking out for early signs of dents and changing where in your body you inject each time

Other common side effects (less than one in ten get these) include muscle stiffness, rash, pain, problems sleeping, stomach pain and weakness. Side effects seen in blood tests include increases in liver enzymes or a drop in how many red or white blood cells or platelets you have.

More serious side effects

allergic reactions
- stop using your beta interferon and get medical help straight away if you notice any signs of an allergic reaction:
  - swelling of the face, lips and tongue
  - itching all over your body
  - difficulty breathing
  - a rash

mood and depression
- some people may get depressed so your doctor might not give you a beta interferon if you’ve had depression in the past
- call your MS specialist or GP straight away if you have changes in your mood
liver problems

- changes in how your liver works are quite common but usually mild and they settle down

Some possible but very rare serious side effects include kidney problems, blood clots in small blood vessels that could affect your kidneys, heart or thyroid problems, seizures and autoimmune diseases.

In More information and support you’ll find where you can get a full list of all possible side effects and other information about this drug.

### Neutralising antibodies

Your immune system makes antibodies to kill viruses and bacteria. Some people find their body makes ‘neutralising antibodies’ against some MS drugs. Over time these antibodies can stop the drug working. Regular blood tests will pick this up. You’ll then switch to a new DMT.

The chance of developing these antibodies depends on the drug. It happens to 2-5% of people on Avonex, 12-25% on Rebif and to 25-35% on Extavia and Betaferon. It happens to less than 1% on Plegridy.

### When should I stop taking this drug?

Beta interferons, like all DMTs except one, are meant to be taken long term. If a beta interferon is controlling your MS well and side effects aren’t a problem, you should be able to take it for years.

Your specialist might recommend you stop taking your beta interferon and switch to another DMT. This can happen if you have bad side effects or the drug isn’t controlling your MS. Switching drugs only usually happens after you’ve taken a drug for six months.

You’ll need to stop taking your beta interferon if your MS changes to secondary progressive MS (but you no longer get significant relapses). DMTs available now can’t help people if they don’t have relapses. But clinical trials are underway testing drugs for these progressive, non-relapsing types of MS.

You’ll need to stop taking your beta interferon if you develop ‘neutralising antibodies’ to it (see box above).

You’ll also need to discuss with your MS specialist whether to stop taking beta interferon if you’re a woman thinking about getting pregnant (see next section for more details).

### Side effects: weighing up the risks of DMTs

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 maybe more serious side effects
- the risk of not being treated

This last point has recently become clearer. We now know that damage could be taking place in your brain between relapses, when it might seem nothing is happening with your MS. Before deciding, talk to others and get the information you need. Some ideas are in More information and support.

### What tests will I need?

Regular blood tests will check that your blood and liver are OK, maybe your kidneys, thyroid and blood pressure too. If you have a heart condition, this will be monitored. Blood tests will check if you’ve developed ‘neutralising antibodies’ which might stop your beta interferon working (see the box above).

ABN guidelines say that you should have MRI scans to see how much difference the drug is making to your MS.
I want a child. Can I take a beta interferon?

We don’t yet know for sure which DMTs are totally safe to take during pregnancy. There isn’t agreement on how safe it is to take beta interferons when pregnant. Some studies show it’s relatively safe but standard advice is you shouldn’t be taking these drugs if:

- you’re trying to get pregnant
- you’re already pregnant (or think you might be)
- you want to breastfeed

If you’re a woman who decides to stop taking this drug before getting pregnant you need to wait until the amount of it in your body drops to a certain level. The time this takes is called the ‘washout period’. Doctors might recommend one month or less for beta interferons. Blood tests will check that the level of drug in your blood has dropped low enough.

Women who’ve just had a baby are more likely to have a relapse. So if you do stop taking this drug it’s recommended you restart it soon after giving birth. If you’re a mother who wants to breastfeed, ask your MS specialist for advice about feeding this way while taking a beta interferon (and after you stop taking it).

Men and women with MS who would like to have a child should discuss this with their MS specialist. Talk to your MS specialist if you’re a woman and you think you may be pregnant.

More information and support

www.mssociety.org.uk/earlytreatment

On this web page you’ll find more about treatment, a report on the evidence for early treatment and links to our a basic guide to DMTs and factsheets on other DMTs.

New guidelines say everyone should have a review of their MS and treatment with a specialist at least once a year. But if you’re not happy with the treatment you’re offered, find tips about what to do in our Talking about treatments checklist, also on this link.
About this resource

With thanks to Louise Coghlin and all the neurologists and people with MS who contributed to this factsheet.

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. Be sure to seek local advice from the sources listed.

Let us know what you think

If you have any comments on this information or on the work of the MS Society, please send them to resources@mssociety.org.uk, or you can complete our short online survey at www.surveymonkey.com/s/MSresources

References

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

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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.

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