



## INTERFERON ALPHA

### WHAT IS INTERFERON?

Interferons are substances which occur naturally in our bodies in small amounts. Our immune system produces interferon to help fight viruses, bacteria and tumours. There are various subtypes including alpha, beta and gamma interferon. The commonest form which has been manufactured is alpha interferon - previously used to treat people with certain viral conditions (eg. hepatitis C) and some types of cancer (eg. melanoma). It is also used to treat myeloproliferative neoplasms (MPNs) such as polycythaemia vera (PV), essential thrombocythaemia (ET) and myelofibrosis (MF).

### HOW INTERFERON WORKS IN MPNS

Interferon suppresses the production of blood cells via multiple and complex mechanisms which is why it can be useful in patients with various types of MPN with overactive bone marrow.

### TYPES OF INTERFERON ALPHA

Interferon is made by a variety of drug companies and is known under several brand names according to the manufacturer. There are two main types of interferon: short and long- acting. In Australia brand names for interferon alpha are Roferon–A and Pegasys. Both are available as clear to light/pale yellow liquid solutions and are given by injection just under the skin (called subcutaneous). They are only available as an injection and are therefore not suitable for people unable to self-inject or tolerate injections. Following PBS-listing of long-acting interferon (Pegasys) in August 2018 it is expected this will almost totally replace use of short-acting interferon alpha (Roferon) in Australia.

**Roferon** is a short-acting interferon alpha available on the PBS for patients with a MPN associated with a high platelet count. It is usually given 3-5 times per week. It is available as a single dose syringe containing the exact amount of drug (3,6 or 9 MIU) required for one injection.

**Pegasys** is a longer-acting formulation (pegylated-interferon) which is injected only once a week and sometimes less often. This may have the advantage of fewer side effects, but a clinical study directly comparing side effects of the two types of interferon has not been performed. It is now on the PBS and is available in 135 ug and 180 ug prefilled syringes. It is usually commenced at a dose of 45 ug weekly and the dose is gradually increased depending upon tolerability and efficacy.

### HOW CAN INTERFERON TREAT MY MPN?

Interferon alpha is currently recommended as an option for first-line therapy for people with essential thrombocythaemia or polycythaemia vera in whom cytoreduction is indicated. It is recommended as one of the second-line options in patients refractory or intolerant to first-line hydroxycarbamide. It is the only agent recommended for women with MPNs who are pregnant or trying to become pregnant.

Several small studies have used interferon, most often pegylated-interferon, for treatment of primary myelofibrosis (PMF) and observed both clinical and histological responses. Pegylated-interferon is more likely to be used in patients with low risk PMF, where reduction in blood counts and thrombosis risk is the main aim of treatment. For intermediate and high risk PMF patients with bulky splenomegaly or a high symptom burden, therapy with ruxolitinib is more likely to be recommended.

Ongoing trials comparing pegylated-interferon with hydroxycarbamide in MPN patients will give further information but it may take years to get definitive results so in the interim whether interferon is appropriate will vary between patients and is best discussed with your haematologist. Interferon has been shown to:

- Normalise elevated blood counts (red cells, white cells and platelets)
- Reduce spleen size
- Reduce thrombosis (clotting) and pruritis (itching)
- It may reduce fibrosis in some people

Patients need frequent blood tests and monitoring whilst taking interferon to ensure correct dosage.

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## ARE THERE ANY SIDE EFFECTS?

Whilst interferon is an effective treatment for MPNs, side effects are relatively common. Approximately 20-30% of people who begin treatment with interferon eventually stop taking it due to side effects. However, many people report that side effects they initially experience reduce over time, allowing them to tolerate ongoing treatment. Many patients tolerate interferon reasonably well especially if commenced at a low dose and gradually increased.

### Important

A list of side effects is outlined below. It is not fully comprehensive and some other unusual side effects can occur. It is important patients inform their doctor if they experience any side effects described, no matter how mild. There are often ways of overcoming side effects or reducing them to a tolerable level.

Anecdotal feedback from patients' experience is that commonest significant side effects are often flu-like symptoms with the first few doses, fatigue, mild nausea, muscle and joint aches and occasionally depression. Some of these can be managed with temporary support in the expectation that they will improve with time (typically the flu-like symptoms), others may need either dose adjustment or changes in lifestyle (eg fatigue), while others may require cessation of the drug (eg significant depression).

**Very common side effects** - affect approximately 10% of patients taking interferon

- Flu-like illness; reduced appetite; temperature; rigors/shivering; fatigue
- Reduced white blood cells
- Loss of appetite/ mild nausea
- Mild headache
- Mild diarrhoea
- Hair thinning/ loss (reversible)
- Joint and muscle pain/discomfort

**Less common side effects** - affect approximately 1-10% of patients taking interferon

- Chest pain
- Fluid retention/ swelling
- Reduced platelets and/or red blood cells
- Mood disturbance which can include depression, anxiety, sleep disorders
- Taste changes
- Palpitations
- Nausea and vomiting
- Abdominal pain
- Dry mouth

**Uncommon side effects** - affect less than 1% of patients taking interferon

- Dehydration
- Tingling/numbness in hands, legs and feet
- Dizziness
- Visual disturbances
- Protein in urine
- Thyroid dysfunction

## TAKING INTERFERON

Your doctor will give you instructions and demonstrate how to inject interferon. Most people inject themselves, as it is straightforward. Help from haematology nurses at your treating hospital or local doctor can be obtained, if required. If you do not feel confident, a relative or friend can be taught to inject you.

**A video on how to inject interferon is available at MPN Alliance Australia's website.**

<https://www.mpnallianceaustralia.org.au/understanding-mpn/treatments/interferon-alpha/>

### Dosage

Pegylated-interferon is better tolerated if it is started at a low dose (usually 45 ug weekly) in the evening. Patients should take paracetamol 30 mins prior to their first injection and regularly for the first few days to dampen the flu-like symptoms that are common with the first few doses of interferon. The dose should be increased gradually depending upon tolerability and efficacy. Your doctor will provide specific dosage recommendations. Please be sure to follow directions precisely.

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## Storage and disposal of interferon

- Store in a fridge between 2-8°C. Do not freeze. Keep syringe and needles in their outer cartons to protect from light. Keep separate from food by placing in a plastic container.
- Keep medication and syringes in a secure location, well out of reach of children and pets.
- You will be given a sharps bin to dispose of your needles once you have used them. Please return full sharps bins back to your hospital or GP's surgery. Do not return used needles in a bag or any other container that could cause an injury to others.
- Return any unused medication and syringes to your local pharmacy or hospital.

Do not dispose of medication or syringes, new or used, in the bin. Do not flush down the toilet.

## Keeping track

Some patients find it helpful to keep a record to remember when to take your tablets (eg medication reminder app on a smart phone) and record any side effects.

## First dose: what should I expect?

- Ensure you have any equipment needed laid out in front of you including your syringe, needle, sharps bin and instructions. Do not rush.
- If you are worried or unsure about the injection you may be able to arrange to give it in the presence of a qualified nurse.
- Take your first dose in the evening, because side effects can start within several hours of your first dose. Taking your first dose late in the day will allow you to sleep through any, of the common initial 'flu-like' side effects such as a chills or fever.
- Take two 500mg paracetamol tablets prior to injecting interferon and every 6-8 hours for the first 24 hours to reduce flu-like symptoms you may experience. Paracetamol can be ceased once flu-like symptoms are gone but should be recommenced with any dosage increase and continued until the higher dose is tolerated without side-effects. Although flu-like symptoms usually last only 24 hours some people can experience them for several days.

## How fast does it work and how will I feel?

The time for interferon to have a noticeable effect on your blood results varies, however it usually takes a minimum of two to four weeks. As your blood counts reduce you may notice your symptoms improving. Any initial side effects experienced often reduce over a period of time.

## TIPS FOR COPING WITH COMMON SIDE EFFECTS

### Flu-like symptoms

(including fever and chills, headache, aches and pains, cough and congestion)

- Take the injection shortly before you go to bed.
- Drink plenty of water.
- Consider paracetamol as discussed above under "Your first dose".
- If your fever is over 38°C and has not reduced with paracetamol contact your doctor.
- Avoid excessive alcohol or caffeinated drinks prior to taking your injections.
- A warm bath, massage or hot pack may help with aches and pains.
- Report any new aches and pains or significant cough you are experiencing since starting interferon to your doctor.

### Lack of energy and fatigue

- Try to keep a regular daily routine to your day, listen to your body, and do not push yourself to complete activities or tasks if it feels too much for you.
- Take a short (40 minute) nap during the day, but not too late in the day as this may affect your sleep at night. Too much sleep can increase fatigue.
- Prioritise activities; ask for help with tasks that you do not have the energy to complete.
- Try to exercise regularly. If you have not previously exercised, do not over-exercise; take it gently and for short periods until you feel able to increase the duration.

### Nausea, loss of appetite and taste changes

- Eat small amounts often instead of three large meals a day.
- If you feel nauseous, avoid fast foods, foods with strong flavours, spicy, sweet, acidic and greasy foods.

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## Mood changes

It is important to monitor yourself for mood changes. If you have significantly low mood, if you lose enjoyment of activities that usually give you pleasure or are frequently experiencing low mood or tearfulness, you should report this to your doctor.

## FREQUENTLY ASKED QUESTIONS

### Will I need follow up?

You will need more frequent blood tests during the first weeks of treatment to determine how your body is responding to the medication. Once your body has adjusted you will need less frequent checks, perhaps once every two to three months. Your kidney, thyroid and liver function may also be checked with blood tests. Dose adjustments according to side effects and response to therapy are common. Eg, patients responding well may require fewer injections (eg Pegasys once a fortnight rather than weekly), or a lower dose. Conversely, others may require an increase in dose if their response is not adequate.

### Can I take other medicines if I am taking interferon?

Some medicines may interact with interferon. Always provide the names of medicines prescribed for you as well as any vitamins, herbal supplements or remedies to haematologists, GPs, and pharmacists who are treating you, It can be very helpful to carry a list of the names and dosages of all your medicines to show to your doctor at appointments.

You must tell your doctor if you are taking theophylline (a medicine used in treatment of asthma, bronchitis, emphysema & related conditions) as you may need to take a different dose of interferon. Your doctor will advise you. Your doctor or pharmacist has more information on medicines to be careful with or avoid while using interferon. Ask your doctor or pharmacist if you are unsure.

### What if I have other medical conditions?

All medications have potential risks and side effects. You should advise your haematologist of any other medical conditions you may have. Interferon alpha should be used with caution, (if at all), if you have any of the following conditions:

- Significant kidney problems or liver problems
- Psychiatric illness or difficulties (current or past)
- An auto immune disease such as thyroid dysfunction, psoriasis or vasculitis

If you think you may have one of these conditions please discuss with your doctor. This may not mean you cannot have interferon, but it should be used with caution.

### What do I do if I forget a dose?

If you have forgotten a dose, take it as soon as you remember but do not take two doses on the same day.

### Can I eat and drink normally?

Yes. We recommend a normal healthy diet and drinking plenty of water.

### Can I drink alcohol?

While it is usually safe to drink alcohol in moderation whilst taking interferon, Australian NHMRC guidelines state that for healthy women and men drinking no more than two standard drinks on any day reduces your risk of harm from alcohol-related disease. Alcohol can cause dehydration and it is important to avoid becoming dehydrated if you have an MPN. You are advised to discuss any alcohol consumption with your doctor when you are being treated with interferon.

### What if I want to have a child?

Whilst it is safe to conceive or father a child whilst taking interferon we always recommend you discuss any plans you have to try to conceive with your doctor and inform him or her as soon as you find out you or your partner is pregnant.

### Can I breastfeed while taking interferon?

Whilst it is known that interferon transfers into the breast milk in small amounts, there has to date been no reports of adverse effects on babies. The decision to breastfeed your baby whilst using interferon should be made by balancing benefits against the risk. Your haematologist and maternity team can help you make this decision.

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## Can I drive?

You may find that when you begin taking interferon that your ability to drive and operate machinery is affected. We recommend when you begin taking this medication that you wait to see how you react before deciding if you are able to drive.

## Can I travel whilst taking interferon?

Yes! We recommend you discuss travel plans with your doctor prior to travelling. Ensure you have suitable travel insurance and sufficient medication to take with you. Most airlines require a covering letter from your doctor to take injections on board. We advise you to check when you book your flight. Keep injections in your hand luggage, as the temperature in the hold may not be appropriate. You will need to ensure your interferon is stored at the correct temperature. One way of keeping your interferon cold is to carry it in a coolbag with a cold pack, however you need to ensure you do not freeze it. Some airlines may offer to refrigerate it for you – ask as you go on board.

Fridge To Go has a number of medical travel wallet products at [www.fridge-to-go.net.au](http://www.fridge-to-go.net.au).

## How do I dispose of my sharps bin once it is full?

Please ensure that full sharps bins are properly closed. Return full bins to the hospital or surgery that provided it to you. Do not use a bag or any other container apart from a sharps bin to return used syringes – this is dangerous and may not be accepted.

## Can I have vaccinations while taking interferon?

Yes, you can have most vaccinations, including the flu vaccine, whilst taking interferon. Some vaccinations are live vaccines (e.g. measles, mumps and varicella virus vaccines) and these should not be taken with interferon. It is always advisable to consult your doctor prior to having a vaccination. Your medical team will check your overall health and immune system status prior to vaccination to ensure that vaccination is safe for you.

## If you need to have a medical procedure or operation

It is important that you inform the doctor or dentist planning the procedure or operation that you are taking interferon and that they discuss plans for your procedure with your haematology doctor.

## WHAT CAN I DO TO HELP MYSELF?

It's important to take good care of yourself. There are many things you can do to feel better.

- Good nutrition is important. Eat a balanced diet including lots of fresh fruit and vegetables, lean protein and whole grains.
- Drink plenty of water and prevent dehydration by avoiding excessive alcohol and caffeinated drinks.
- Maintain a normal weight and maintain your muscle mass to help keep your cholesterol and blood sugar within normal limits.
- Exercise is very beneficial for people with MPNs and helps to fight fatigue. Before starting on any new programme, check with your GP or haematologist and start slowly and gently.
- Stop smoking. Ask your GP if you need help.

More information on living well with an MPN is available at [www.mpnallianceaustralia.org.au](http://www.mpnallianceaustralia.org.au)

