leukaemia & blood cancer NEW ZEALAND

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MYELOPROLIFERATIVE NEOPLASMS – POLYCYTHAEMIA VERA (PV)

A fact sheet for patients, families and whānau

WHAT IS A MYELOPROLIFERATIVE NEOPLASM (MPN)?

Polycythaemia vera (PV) is an MPN. MPNs are a group of diseases in which the bone marrow makes too many cells (red blood cells, white blood cells or platelets). MPNs are a type of blood cancer.

Your blood

Blood is made up of blood cells and plasma. Plasma is a light-yellow coloured liquid in which blood cells travel around your body.

You have three main types of blood cells – red blood cells, platelets and white blood cells. These blood cells are created in your bone marrow and are then released into your bloodstream so they can move around your body.

Bone marrow is the spongy material inside your bones (see Figure 01). In your bone marrow there are cells called blood stem cells. Blood stem cells create the new blood cells in your body.

Red blood cells transport oxygen from the lungs to all the cells in your body. There is a protein called haemoglobin (heem-a-glow-bin) in each red blood cell that carries the oxygen throughout your body and gives it a red colour. A low level of haemoglobin in your body is called anaemia (a-nee-me-a).

White blood cells fight infection. If your white blood cell count is low, you may be more at risk of getting an infection. There are many different types of white blood cells that work slightly differently to protect the body against infection. Neutrophils (new-tra-fils) are the most common type of white blood cell and are the first-line defence against bacteria entering your body. A low number of neutrophils in your body is called neutropenia (new-tra-pee-nee-a).

Platelets help your blood to clot and prevent or stop bleeding. For example, if you get a cut, the platelets go to where the injury is, stick together and stop the bleeding (see Figure 02 for the different cells in your blood).

What is PV?

PV is a rare disease where too many red blood cells are made in the bone marrow. For many people with PV there is also an increase of white blood cells and platelets. Having too many blood cells can cause complications like bleeding or blood clots.

PV is a rare chronic disease with approximately 60 people diagnosed in New Zealand each year. Although it can be diagnosed at any age, the average age for diagnosis is 60 years old. PV is more common in men than in women.

Figure 01
Bone marrow

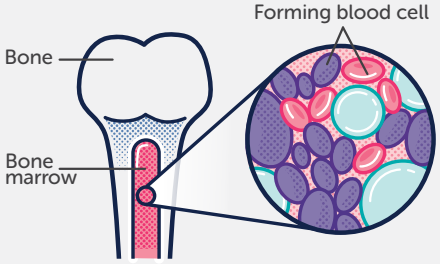
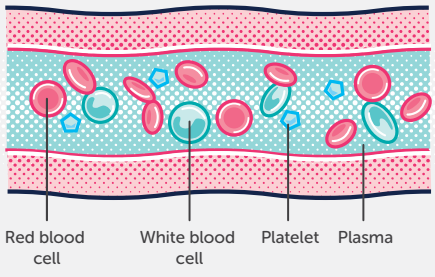


Figure 02



What causes PV?

The cause of PV is usually a mutation (change) in a gene called JAK2. This is not typically something you inherit or pass on to family members, but is a genetic change that occurs in your lifetime. It is not contagious, and you cannot pass it on to others. It is not known why some people develop specific mutations like this. In rare cases, mutations have been found to run in families, which increase the risk of developing PV over time. JAK proteins send signals that affect the production of blood cells in the bone marrow. When they are working properly, they carefully monitor the number of blood cells that are being made. The mutation in the JAK2 gene leads to a signal that is now always 'turned on', regardless of signals from your body telling it to stop. The end result can mean too many red blood cells are being made. The number of white blood cells and platelets can also increase.

What are the symptoms of PV?

PV develops slowly and may not cause symptoms for many years. It is often picked up in a routine blood test.

Symptoms may include:

- Headache
- Weakness or dizziness
- Fatigue
- Red or itchy skin
- Changes in vision
- Excessive sweating
- Red or burning hands or feet (erythromelalgia)
- Excessive bleeding or bruising
- Weight loss
- Feeling bloated, or abdominal pain due to an enlarged spleen
- Gout (painful inflammation in the joints).

Complications of PV

The most important complication to avoid is the development of thrombosis (blood clots). Thrombosis may be a complication of PV due to the greater number of red blood cells and platelets. The survival rate from PV is generally very good for the first 10–15 years, unless there is a serious blood clot. Thrombosis can include a stroke, heart attack, pulmonary embolism (clot in the lungs) or a deep vein thrombosis (blood clot in the legs). Because the symptoms of PV are very non-specific, approximately one in four people are diagnosed with PV at the time of presentation to hospital with a thrombotic event.

An enlarged spleen might also be a complication of PV. The spleen is an organ on the left side of the abdomen near the stomach and rib cage. The spleen's job is to filter the blood, store blood cells and destroy old blood cells. The spleen can become enlarged when it is working harder to manage an increase in the amount of blood cells.

Having an enlarged spleen might cause symptoms like:

- Weight loss
- Indigestion or bloating
- Loss of appetite.

There is a small risk (10–15%) that PV can transform to myelofibrosis (MF) (my-low-fibe-row-sis) or acute myeloid leukaemia (AML), however this is unusual.

MF is when the bone marrow is scarred, also known as fibrosis. Rather than making too many blood cells, the bone marrow stops making enough, and often people with MF need regular blood transfusions. Bone marrow is like a factory – the consequence of having a factory fully cranked up for many years is that it is more likely to fail prematurely. See the LBC website for a fact sheet on myelofibrosis.

AML is an aggressive bone marrow cancer. Rather than making useful cells (red blood cells, white blood cells and platelets), the bone marrow starts to make leukaemic cells that serve no function. These cells can quickly take over the bone marrow and crowd out the normal cells. See the LBC website for a booklet on AML.

How is PV diagnosed?

For many people, PV is diagnosed after a routine blood test finds high numbers of red blood cells. Sometimes there are also high numbers of white blood cells and platelets. Further tests might be done to find out why those blood levels are high and to rule out other blood conditions.

Common tests for diagnosing PV are:

- Blood tests, including genetic tests to check for a JAK2 gene mutation
- Erythropoietin level in the blood (a signal for red blood cell production)
- Bone marrow biopsy to see what's happening in the bone marrow.

A bone marrow biopsy is a test where the doctor takes a sample of your bone marrow to be examined under a microscope. The sample is usually taken from the back of your hip bone (iliac crest). To do a bone marrow biopsy the doctor puts a long needle through the numbed skin into the bone, where they draw out some of the bone marrow material. The doctor will numb the area where the biopsy is taken and might give you a drug to make you relaxed and sleepy. You might also have some pain relief.

If you need a bone marrow biopsy, we recommend you take someone with you for this procedure for support, and to drive you home as you might feel drowsy from the procedure and/or medicines used.

How is PV managed?

To date there is no cure for PV, as there is no way to remove the JAK2 mutation from the bone marrow cells. Since the prognosis of PV is generally very good, the main focus is to manage symptoms and prevent the risk of developing a blood clot. This is mainly done by two general approaches to reduce the haematocrit (hee-ma-toe-crit) of the blood – venesection, and medication/drugs.

Note: A haematocrit (HCT) blood test measures the proportion of red blood cells in your blood. It is expressed as a percentage, e.g. a haematocrit of 50% means that there are 50mL of red blood cells in 100mL of blood.

Venesection

Venesection or phlebotomy (fle-bot-o-mee) can be used to manage PV by taking out some of the blood in your veins to reduce the number of blood cells. This is often a first treatment option as it works quickly and there aren't many risks or side effects associated with it. It is a lot like donating blood, but the aim is to bring your red blood cell count closer to normal.

At first, you may need venesections as often as every one or two weeks until you reach an acceptable level of red blood cells. After that, less frequent venesections are needed. Iron is also removed with the blood cells. Because iron is needed to make more red blood cells, removing iron means you make fewer of them, so fewer venesections are required.

A low iron level is normal among people having venesections – it is how the venesection procedure works. You should avoid taking iron supplements if you have PV unless advised to by your doctor, and usually only with close blood count monitoring.

This is because high doses of iron can cause a rapid rise in the haematocrit in people with PV, which can increase the risk of thrombosis.

Venesection is very effective in controlling red blood cells but isn't effective in controlling platelets and white blood cells. The most common side effects from venesection are headaches and dizziness.

Medications

The most common drugs used in PV are:

- Aspirin
- Hydroxycarbamide (also known as hydroxyurea)
- Pegylated interferon (PEG-IFN).

Aspirin

Aspirin is used to reduce the risk of blood clots and manage any clots that have already formed by making them less 'sticky'. It is part of a group of drugs called non-steroidal anti-inflammatory drugs (NSAID). This means that it reduces inflammation but isn't a steroid.

Common side effects include stomach discomfort or indigestion and bruising/bleeding.

Hydroxycarbamide (also called hydroxyurea)

Hydroxycarbamide is sometimes classed as a chemotherapy drug, although it works differently to other chemotherapies used for cancer. Hydroxycarbamide works by suppressing the function of your bone marrow and controlling blood cell production. It interferes with the production of DNA of blood cells, slowing blood cell production.

Common side effects include:

- Fatigue and tiredness
- Diarrhoea or constipation
- Gout (pain and inflammation in joints).

Less common side effects that affect less than 1% of people include:

- Nausea, vomiting, loss of appetite
- Skin changes (itchy skin, ulcers, skin rashes and sun sensitivity)
- Changes in kidney or liver function
- Headache, dizziness or hallucinations
- Fever or chills.

Side effects of hydroxycarbamide can include symptoms of low blood counts, such as increased risk of infection, anaemia and bruising/bleeding. It is important that you have blood count monitoring at least every 3–6 months during hydroxycarbamide use, to ensure the dose is right for you.

Around 1 in 50 people experience a reaction to hydroxycarbamide, with fever, rash and liver or kidney function problems. This usually happens in the first few weeks of hydroxycarbamide use. If you experience this, you should stop taking hydroxycarbamide and inform your doctor.

Pegylated interferon (PEG-IFN)

Pegylated interferon (also called pegylated interferon alfa-2A, or interferon alfa) belongs to a group of agents called cytokines that stimulate the immune system to help fight the cancer.

PEG-IFN is funded in New Zealand for people with PV as an alternative drug if hydroxycarbamide is not tolerated. It is also the medicine of choice if someone is planning on becoming pregnant or is already pregnant.

PEG-IFN is usually given as a weekly subcutaneous injection (just under the skin) and is often started at a low dose and increased gradually over time as tolerated. Many patients are able to reduce their dosage to low levels and reduce the frequency of injections once their blood counts are under control.

Common side effects include:

- Fatigue
- Weakness
- Flu-like symptoms (headache, muscle aches, tiredness and fever)
- Injection site reactions (bruising, itching and/or irritation)
- Nausea and/or poor appetite
- Liver changes
- Muscle wasting
- Mood changes (irritability, anxiety and/or depression).

There are no curative treatments for most people with PV – currently the treatment for PV is mainly focused on preventing thrombosis complications. There is no proven way to reduce the risk of developing MF or AML.

For younger people with PV that does transform to MF or AML, an allogeneic stem cell transplant might be considered, which can prevent the PV coming back.

Clinical trials

Clinical trials are research studies that help determine whether a new treatment is safe, effective and works better than the current treatment. Ask your haematologist if there are any clinical trials that you are eligible to be on. The benefits of participating in a clinical trial are that you have access to the latest treatments or developments to current treatments. There may also be some risks involved, which depend on the type of clinical trial and your own health.

PV and pregnancy

In general, pregnancy increases the risk of blood clots, and PV adds further to this risk. Aspirin and sometimes other anticoagulants (blood thinners) are often recommended during pregnancy, as well as after delivery. Hydroxycarbamide is usually avoided during pregnancy or for people planning to become pregnant, due to the potential risk to the developing foetus. Venesections or PEG-IFN are often used in pregnant people. You should speak with your haematologist if you become pregnant or if you are trying to become pregnant.

Future treatments

There is ongoing research into developing other treatments for PV, and more effective ways to manage MPNs, through diet and exercise. A haematologist can advise if new treatments or clinical trials are available. Publicly funded medicines in New Zealand may differ from those funded in other countries.

Looking after your health

It is important to try and have a balanced lifestyle with a focus on quality sleep, good nutrition, adequate hydration and regular exercise.

Smoking, diabetes or high blood pressure can increase your risk of thrombosis even more. Your doctor may advise you on ways to stop smoking and/or maintain a healthy weight and blood pressure.

It can be hard to know how to make these changes so please ask your health care team or LBC Support Services Coordinator for more information. They may be able to refer you to other helpful organisations that can also support you.

Important information available online

For more information and to download other fact sheets, see our website **www.leukaemia.org.nz**

QUESTIONS & NOTES

If you would like to get in touch:
Call: 0800 15 10 15
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Mail: PO Box 99182, Newmarket, Auckland 1149
Or visit one of our Support Services offices in Auckland, Hamilton, Wellington, Christchurch or Dunedin.