

## R-CODOX-M chemotherapy for lymphoma

Your doctors have suggested that you are likely to benefit from a course of R-CODOX-M chemotherapy treatment. They have weighed the expected benefits in terms of controlling the cancer and its symptoms, against the possibility of side effects. Your doctor will have discussed these with you.

The aim of this treatment is to shrink the cancer and potentially cure the disease. It is not possible to predict, before you start treatment, how your cancer will respond and if the response will be permanent. This information sheet explains what you can expect from the chemotherapy you will receive.

R-CODOX-M chemotherapy is a combination of six drugs. They are cyclophosphamide, doxorubicin, vincristine, methotrexate, cytarabine and rituximab (a monoclonal antibody). These are given into a vein (intravenously [IV]). A standard part of this treatment is to perform lumbar punctures (injections at the base of the spine) and inject chemotherapy drugs into the fluid surrounding the spinal cord (cerebrospinal fluid [CSF]), this is called an intrathecal (IT) injection. Two different drugs are given as IT injections; these are methotrexate and cytarabine.

### Treatment plan

Your R-CODOX-M chemotherapy will be given as follows:

- Cyclophosphamide – given as an injection (IV) on days one to five
- Doxorubicin – given as an injection (IV) on day one
- Vincristine – given as a drip (infusion) IV on day one and day eight
- Rituximab – given as an IV infusion (over a period of between 90 minutes and four hours) on day one and day seven
- Cytarabine – given as an injection (IT) the day before your IV chemotherapy starts and on day three. This will also be given on day six if lymphoma cells are present in CSF.
- Methotrexate – given as an infusion over 24 hours on day 10. This will be followed by IV fluids until the methotrexate level in the blood falls to a certain level.
- Methotrexate – given as an injection (IT) on day 15. This will also be given on day 17 if lymphoma cells are present in CSF.
- Injections called GCSF will start on day 13 to boost the white blood cell count.



The treatment is not given on a set cycle, but once your blood counts have reached a certain level, the next part of the treatment will start. Usually you would receive two cycles of this treatment alternating with two cycles of R-IVAC chemotherapy (see separate sheet).

You will need a central venous access device to receive your treatment. The best option for this will be discussed with you (see the booklet *Central venous access devices* for further information). All the treatment is given as an inpatient and you are likely to remain in hospital for three to four months. There may be opportunities for you to go home for very short periods only.

### **Monoclonal antibodies**

Rituximab is an antibody that recognises a certain protein called CD20 that is found on the surface of white blood cells called B Lymphocytes. CD20 is found on both normal B Lymphocytes and abnormal (malignant) B cells. The antibody 'locks on' to the protein (like a key in a lock). This process may trigger the body's immune system to attack the cells. Rituximab attacks both abnormal (malignant) and normal B-cell lymphocytes. The body replaces any normal white blood cells which may be damaged, so the risk of side effects from this treatment is small.

Rituximab is used to treat many different types of B cell Lymphoma's or Lymphoid malignancies that have the CD20 protein. It is also used to treat non-malignant conditions such as EBV (Epstein Barr Virus).

Rituximab is given as an infusion (drip) into your vein through a cannula (fine tube). Some people can have an allergic reaction to this treatment and to reduce the risk of this, the first dose it is given slowly over a number of hours. You will be given steroids, antihistamines and paracetamol before the treatment begins to reduce the effects of any reaction. Further doses can be given over one and a half to two hours if there are no complications with the first infusion. Your doctor or nurse will discuss with you the number and frequency of infusions you are likely to have.

This information sheet should be read together with the booklet *Chemotherapy; your questions answered*. This booklet offers general information about chemotherapy and details many of the side effects and how to manage them. If you have not yet received this booklet, please ask for it along with any others mentioned in this information sheet.

### **Side effects of Rituximab**

All drugs can have side effects and this is true of Rituximab. Potential side effects you may experience are as follows:

- Allergic reactions - These can occur while the infusion is in progress, but should not last for long. This is due to the reaction of your body to a foreign antibody. You will be closely monitored for the following symptoms and you should report them immediately if they occur:
  - Flu like symptoms, fever, chills, headache, dizziness
  - Feeling breathless or wheezy
  - Feeling sick (nauseas)
  - Development of a rash or itchy skin



- Feeling of swelling in the tongue, throat or lips
- Tightness or pain in the chest.

The infusion may need to be stopped and then restarted when the symptoms have ceased. Any lingering effects should disappear once treatment is completed. If however, you experience any of these symptoms or feel unwell at home following the infusion, please contact your nurse as soon as possible.

- Low blood pressure – this may happen during the infusion. Your blood pressure will be checked regularly. If you normally take any medication to lower your blood pressure. please tell your doctor or nurse.
- Nausea and vomiting – Rituximab can sometimes cause this. It can usually be managed with anti-sickness (anti-emetic) drugs. For further information please visit Macmillan Cancer Support at [www.macmillan.org.uk](http://www.macmillan.org.uk)

### Later side effects

Risk of infection – Rituximab can reduce the number of normal white blood cells, particularly B lymphocytes. These cells are responsible for fighting infections particularly viruses, so you may be more prone to colds. It can also lower your immunity by reducing the levels of one antibody in your blood called IgG; this can further increase your risk of infection. If your IgG level is found to be low and you have frequent infections, you may require immunoglobulin infusions or low dose antibiotics. If you feel unwell at home, please contact your nurse as soon as possible.

### Rare side effects

- Thrombocytopenia – Low platelet count which may increase your tendency to bleeding and you may need platelet transfusions.
- Low red cell count – Anaemia; you may require a blood transfusion.
- Neutropenia - Low white blood cell count; this may increase your risk of infection.
- Reactivation of hepatitis infection – If you have ever had hepatitis in the past, this can be reactivated following Rituximab infusions. For this reason we test all patients receiving this treatment for Hepatitis B and C.
- Progressive Multifocal Leukoencephalopathy (PML) – This is a rare side effect causing serious brain infection. If you notice any of the following side effects you must report and tell you team immediately:
  - Memory loss, confusion or difficulty thinking
  - Loss of balance, weakness in one side of the body or difficulty walking
  - Changes in speech
  - Loss of vision.
- Heart problems –You must inform your doctor or nurse if you are known to have heart problems. In some patients, irregular heartbeats or chest pain may occur, particularly in those known to have these conditions already.



## Side effects of chemotherapy

All drugs can have some side effects and this includes R-CODOX-M chemotherapy. These vary and for some people they may not occur.

### The more common side effects of R-CODOX-M chemotherapy are:

- Tiredness or lethargy – during your chemotherapy, you may become very tired a few days following treatment. Pace yourself and rest as necessary.
- Low blood count – chemotherapy temporarily reduces the rate at which blood cells are produced in your bone marrow. This may cause:
  - Anaemia (low red cell count) – you may need blood transfusions.
  - Neutropenia (low white cell count) – this may increase your risk of developing an infection, which may be serious and life threatening, you may need intravenous antibiotics.
  - Thrombocytopenia (low platelet count), which may increase your tendency to bleeding - you may need platelet transfusions.

**If you feel unwell at any time or have a temperature (37.5°C/99.5°F or higher or 35.5°C/95.9°F or lower) and you are at home, you should contact the hospital immediately** as you may need to be admitted for intravenous antibiotics. For further information please refer to the booklet *Chemotherapy; your questions answered*.

- Nausea and vomiting – chemotherapy sometimes causes this. It can usually be managed with anti-sickness (anti-emetic) drugs. For further information please visit Macmillan Cancer Support at [www.macmillan.org.uk](http://www.macmillan.org.uk)
- Hair loss (alopecia) – temporary hair loss usually happens. For further information please refer to the Macmillan booklet *Coping with hair loss*.
- Sore mouth – keep your mouth clean and healthy by drinking plenty of fluids and carrying out good oral hygiene. You will be given prescribed mouthwash to help with this. You will be given medication called folic acid for a period of time after the methotrexate. Pain relief (analgesia) will be given if needed.
- Numbness and tingling in the hands and feet (peripheral neuropathy) – vincristine can cause problems with the nerves in the body. It can cause sensations such as tingling, burning, numbness or pins and needles in the hands and/or the feet. Tell your doctor if you get any of these sensations, so they can be monitored. Most of the time these symptoms will get better after your treatment ends, although it may take some time.
- Effects on the bladder – cyclophosphamide and methotrexate can cause irritation to the bladder. Drinking plenty of fluids will help prevent this. You will be given a drug called folic acid from 24 hours after the methotrexate and this will continue until the doctor advises to stop. However, if you notice blood in your urine, please tell your doctor or nurse. Doxorubicin is red in colour and may cause your urine to become pink or red for up to 24 hours following each treatment.
- Constipation – if you experience constipation, it can be treated with laxatives.
- Skin and nail changes – your skin may become darker, redder and more sensitive to light. You will need to take care in the sun as your skin may burn more easily during treatment and for



several months afterwards. Your nails may become darker than usual and they may develop ridges. White lines may appear on them. These changes usually grow out over a few months after the treatment has finished.

- Damage to the kidneys – methotrexate may affect your kidneys. This is unlikely to cause you any symptoms, but rarely the kidneys may be permanently damaged. Your kidney function will be checked by a blood test before each treatment and the methotrexate will be stopped or reduced if the blood test shows any signs of damage.
- Headaches – if you have a headache for more than 24 hours, you must inform your Doctor or Clinical Nurse Specialist.

#### **Less common side effects are:**

- Lung damage – cyclophosphamide can cause changes to the lungs. Tell your doctor if you have any changes in your breathing or a cough.
- Changes in liver function – there may be changes in the way your liver works.
- Damage to the heart muscle – there is evidence that very large cumulative doses of doxorubicin (all the doses added together) could cause long-term heart damage. The total dose that we use is far below this and therefore the risk is extremely small. It is important, however, that you inform your doctors at once if you have had heart disease in the past.
- Eye irritation – doxorubicin can cause inflammation of the outermost layer of the eye and the inner surface of the eyelids (conjunctivitis). It can also cause excessive tear production.
- Secondary cancer – there is a small chance that cyclophosphamide may cause a secondary cancer. If this is a concern, please discuss with your doctor.

#### **Fertility, pregnancy and breastfeeding**

- Fertility – chemotherapy can damage the testis or ovary. This may affect your ability to conceive (or father a child). Infertility can be temporary or permanent. Sometimes in women, chemotherapy can lead to premature menopause. If relevant to you, you may want to discuss the issue of fertility with your doctor before treatment is started.
- Pregnancy – during chemotherapy and for up to a year afterwards, if sperm or eggs are produced they may be abnormal. Treatment can also harm an unborn child. We recommend that you or your partner use a barrier method of contraception, such as condoms, during treatment and for one year afterwards. If you know you are pregnant before starting treatment or become pregnant during treatment, you must tell your doctor immediately.
- Breastfeeding – there is a risk of harm to a child who is being breastfed since the drug may be concentrated in the milk. It is very important that women do not breastfeed while receiving chemotherapy.



## Blood clots

Both the lymphoma and the chemotherapy can increase the risk of developing blood clots. Blood clots can occur in the veins causing problems like deep vein thrombosis (clot in the leg causing swelling of the leg) or pulmonary embolus (clot in the lung causing shortness of breath or chest pain). Blood clots can also occur in the arteries leading to a heart attack, stroke or impairment of the blood supply to a limb. Blood clots can be life threatening but can usually be treated by drugs that thin the blood. If you are concerned about any of the above, please inform your doctor immediately.

Airline travel is also associated with an increased risk of blood clots. It is important that you inform your hospital team of any travel plans while you are on treatment.

We have listed the most common side effects of this chemotherapy. You may experience some or several of these side effects listed above and they may be mild, moderate or severe. Some can occasionally be life-threatening.

As with all drugs, there may be other side effects not mentioned here that you may experience. Because of the risk of side effects, it is important that you:

- Always tell your doctor if you suffer from any of these side effects, or if you have experienced any new symptoms since your last visit. Your doctor can help you by giving you medication or advice, to reduce or stop these side effects from occurring in the future.
- Always tell your doctor about any other medicine you are taking or planning to take, including herbal and complementary therapies.
- Always consult your doctor before having any other procedure, for example, dental work or vaccinations.

## Contact details

Please contact your Clinical Nurse Specialist if you have any concerns or queries.

Sutton: 020 8661 3987

Chelsea: 020 7808 2247

Alternatively, please call:

**The Royal Marsden Macmillan Hotline:** 020 8915 6899  
(available 24 hours a day, 7 days a week)

