Rituximab Fact Sheet

(ri TUK si mab)

Generic Name:	Rituximab
	Rituximab and hyaluronidase, if given subcutaneously (injected under the skin)
Trade Name:	Rituxan®
	Rituxan Hycela®, if given subcutaneously (Rituxan SC in Canada)
Biosimilars:	Truxima®, Ruxience®
	Rixathon® is an approved biosimilar in Europe.
	Additional biosimilars are being considered for approval.

Drug Type:
Rituximab is a targeted therapy classified as a monoclonal antibody.

What Conditions Are Treated by Rituximab:
Rituximab is U.S. Food and Drug Administration (FDA) approved for treatment of chronic lymphocytic leukemia (CLL), certain types of non-Hodgkin's lymphoma (NHL), and certain autoimmune disease conditions. Rituximab is frequently used in combination with other drugs, including chemotherapy and other targeted therapies, for the treatment of Waldenstrom's macroglobulinemia (WM). Rituximab may also be regarded as a reasonable choice for treating patients with IgM anti-MAG (myelin-associated glycoprotein) antibody-related neuropathies.

How Rituximab Is Given:
Rituximab is given as an infusion into a vein (intravenous, IV). There is no pill form of rituximab. Rituxan Hycela is administered subcutaneously (injected under the skin). All patients must receive at least one full dose of intravenous rituximab without experiencing severe side effects prior to initiating treatment with subcutaneous Rituxan Hycela. Medications are given before intravenous infusion or subcutaneous injection to reduce the occurrence of side effects associated with the administration of the drug. Rituxan Hycela is not approved by the FDA nor endorsed by the National Comprehensive Cancer Network (NCCN) for treatment of WM.

The amount of rituximab you will receive depends on many other factors, including your height and weight, your general health or other health problems, and the type of cancer you have. Your doctor will determine your dosage and schedule.

Rituximab is available in the US and Europe as a biosimilar. A biosimilar is an almost identical equivalent to an original biologic product that is manufactured by a different company. It is an officially approved version of the original "innovator" product and can be manufactured when the original product's patent expires. In the case of rituximab, its patent expired in Europe in 2013, and several companies since then have been developing their own biosimilars for it. Europe approved biosimilars for rituximab sooner than the US did, primarily because it took the US longer to determine its approval process for biosimilars.

Rituximab Side Effects:
Most people do not experience all the rituximab side effects listed. Side effects are often predictable in terms of their onset, duration, and severity. They are almost always reversible and will go away after treatment is completed.

Rituximab Fact Sheet

The following rituximab side effects are common (occurring in greater than 30% of patients): fever and chills, flu-like symptoms.

The following are less common side effects (occurring in 10-30% of patients): weakness, nausea, headache, cough, runny nose, shortness of breath, sinusitis, and throat irritation.
A potential side effect of rituximab therapy is a severe infusion reaction, typically with the first infusion (during infusion or within 30-120 minutes of infusion). You will be given medication prior to the infusion to reduce the occurrence and severity of this reaction and monitored carefully during the infusion. If signs of reaction occur, the infusion is stopped. In most cases, the infusion can be restarted at a slower rate once symptoms subside.

Severe skin reactions can occur at the injection site in patients taking this drug via both the intravenous and subcutaneous routes. Get medical help right away if you have signs like red, swollen, blistered, or peeling skin (with or without fever); red or irritated eyes; or sores in your mouth, throat nose, or eyes.
Extended use of rituximab, as in maintenance therapy, can lead to an increased incidence of sinusitis and bronchial infections.

Other serious side effects include a recurrence of chest pain or irregular heartbeats in patients who have had them in the past. If these occur, tell your doctor or nurse so that you can be treated. Also, rapid destruction of cancer cells can cause kidney problems. The use of rituximab may activate or exacerbate certain viruses, including JC virus (which can cause a brain infection in the immunosuppressed), hepatitis B and C, herpes zoster (shingles), and cytomegalovirus. Late-onset neutropenia (a decrease in a certain type of white blood cell called a neutrophil) has been reported to occur with rituximab use.

This document does not contain all possible drug interactions.

When to Contact Your Doctor or Health Care Provider:
Contact your health care provider immediately, day or night, if you should experience any of the following symptoms: fever of 100.4° F (38° C) or chills (both are possible signs of infection), shortness of breath, chest pain or discomfort, swelling of your lips or throat, confusion.

The following symptoms require medical attention but are not emergency situations. Contact your health care provider within 24 hours if you notice any of the following: rash, sore joints, nausea (interferes with ability to eat unrelieved with prescribed medications), vomiting (more than 4-5 times in a 24 hour period), sore throat, cough, redness or inflammation, or pain or burning with urination.

Before starting rituximab treatment, all patients must be tested for hepatitis B infection. Tell your doctor about any other medications you are taking, including prescription, over the counter, vitamins, herbal remedies, etc. Do not receive any kind of immunization or vaccination without your doctor's approval while being treated with rituximab. Inform your health care professional if you are pregnant or may be pregnant prior to starting this treatment, as this medication's use in pregnancy must be weighed relative to the benefit to the mother vs. risk to the fetus. For both men and women: do not conceive a child (get pregnant) while taking rituximab. Barrier methods of contraception, such as condoms, are recommended. Discuss with your doctor when you may safely become pregnant or conceive a child after therapy. Do not breast feed while taking this medication and for 6 months after the last dose.

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Rituximab Fact Sheet

Always inform your health care provider if you experience any unusual symptoms.

Self Care Tips While Taking Rituximab:
Rituximab may cause temporary low blood pressure during the infusion. If you are taking medication to reduce your blood pressure, check with your doctor or nurse about whether you should take it as usual or not before the infusion.

You may experience shortness of breath, feel flushed, or experience dizziness during the infusion. You will most likely receive medication before the infusion to help reduce these side effects, and you will be closely monitored during the infusion.

For flu-like symptoms, keep warm with blankets and drink plenty of liquids. There are medications that can help reduce the discomfort caused by chills. Drink 2 to 3 quarts of fluid daily for the first 48 hours after each infusion, unless you were told to restrict your fluid intake. Rituximab infrequently causes nausea. But if you should experience nausea, take anti-nausea medications as prescribed by your doctor, and eat small, frequent meals. In general, drinking alcoholic beverages should be avoided. Maintain good nutrition. You may experience drowsiness or dizziness; avoid driving or engaging in tasks that require alertness until your response to the drug is known. If you experience symptoms or side effects, be sure to discuss them with your health care team. They can prescribe medications and/or offer other suggestions that are effective in managing such problems.

Monitoring and Testing While Taking Rituximab:
Your blood pressure, temperature, and pulse will be checked regularly while you are receiving a rituximab infusion. You will be checked regularly by your health care provider while you are taking rituximab treatments to monitor side effects and check your response to therapy. Periodic blood work to monitor your complete blood count (CBC) as well as the function of other organs (such as your kidneys and liver) may also be ordered by your doctor.

Temporary increases in immunoglobulin M (IgM) titers, also called the IgM flare, have been reported in 40% to 50% of patients after the start of Rituximab therapy. The Rituximab-related IgM flare may lead to symptomatic hyperviscosity (increase in viscosity or thickness of the blood, so that it does not flow freely), as well as worsening of IgM-related neuropathy, cryoglobulinemia, and other IgM-related complications. These levels may persist for months and do not indicate treatment failure but may necessitate plasmapheresis to reduce viscosity of the blood. Preventive plasmapheresis may be considered in patients with high IgM levels (typically 4,000 mg/dL or higher) before rituximab treatment to decrease the risk of symptomatic hyperviscosity. Another strategy to decrease the risk of IgM flare is to withhold rituximab during the first one or two cycles of combination therapy until the IgM declines to a safer level and then introduce rituximab.

How Rituximab Works:
Rituximab is classified as a monoclonal antibody. Monoclonal antibodies are a relatively new type of targeted cancer therapy.

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Rituximab Fact Sheet

Normally, the body creates antibodies in response to an antigen (such as a protein in a bacteria or virus) that has entered the body. The antibodies attach to the antigen in order to mark it for destruction by the immune system. To make anti-cancer monoclonal antibodies in the laboratory, scientists analyze specific antigens on the surface of cancer cells (the targets). Then, using animal and human proteins, they create a specific antibody that will attach to the target antigen on the cancer cells. When given to the patient, these monoclonal antibodies will attach to matching antigens, like a key fits a lock.

Since monoclonal antibodies target only specific cells, they may cause less toxicity to healthy cells. Monoclonal antibody therapy is given only for cancers in which antigens (and the respective antibodies) have been identified.

Rituximab works by targeting the CD20 antigen on normal and malignant B-cells. Then the body's natural immune defenses are recruited to attack and kill the marked B-cells. Stem cells (young cells in the bone marrow that will develop into the various types of cells) do not have the CD20 antigen and are not harmed by rituximab. This allows healthy B-cells to regenerate after treatment.

NOTE: The information in this fact sheet is intended to be helpful and educational, but it does not constitute an endorsement by the IWMF and is not meant to be a substitute for professional medical advice. The IWMF strongly encourages discussions with healthcare professionals about specific medical conditions, side effects, and treatments.

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(Adapted from the Chemocare website, www.chemocare.com, sponsored by the Cleveland Clinic and Lexicomp® www.wolterskluwercdi.com/lexicomp-online/)