

# What is Radioimmunotherapy?

## What is radioimmunotherapy and how does it work?

Radioimmunotherapy (RIT) involves a small amount of radioactive material (radionuclide) — that is combined with a molecule engineered in a laboratory (monoclonal antibody). This monoclonal antibody-radionuclide compound is called a radiopharmaceutical. Monoclonal antibodies are able to recognize and bind to specific features of cells, such as antigens and cell receptors. When injected into the patient's bloodstream, the radiopharmaceutical attaches to cancer cells, delivering a high dose of radiation to be delivered to the tumor.

## What conditions are treated with radioimmunotherapy?

There are two RIT agents approved by the U.S. Food and Drug Administration (FDA): Zevalin and Bexxar. Both of these are used to treat patients with B-cell Follicular non-Hodgkin lymphoma (NHL) that has not responded to chemotherapy treatment, although these can be used in some other types of lymphomas or scenarios as a part of the treatment for a patient's lymphoma. Zevalin, consists of a radioactive molecule Yttrium-90 (Y-90) combined with the monoclonal antibody ibritumomab tiuxetan; Bexxar, is a compound consisting of Iodine-131 (I-131) and tositumomab. Currently, only Zevalin (Y-90 Ibritumomab tiuxetan) is available on the market.

## How is radioimmunotherapy performed?

Patients typically undergo one or two sessions of RIT. A team of medical professionals, including an oncologist, a nuclear medicine physician and a radiation safety officer, administers the treatment intravenously.

Before treatment begins, the patient receives an infusion of a non-radioactive (or cold) version of the monoclonal antibody that attaches to other areas in the body to protect them from the radioactive antibody used in the therapy. This infusion may take up to 4-5 hours to complete. The following week, another infusion of the non-radioactive monoclonal antibody is repeated, which is then followed by a shorter infusion of the therapeutic radioactive version of the monoclonal antibody. This infusion is much shorter and may take an hour to set up and perform. No additional visits for infusion are needed after that.

## What are the advantages of radioimmunotherapy?

RIT offers more personalized cancer treatment because radiopharmaceuticals can be tailored to the unique biologic characteristics of the patient's tumor, are highly selective in their ability to adhere to cancer cells, and can limit radiation exposure to healthy tissue.

As a result, RIT has fewer and less severe side effects and is generally well tolerated. Typical side effects are short-term and include fever, chills, reduced blood cell counts, low blood pressure, diarrhea and rash. Occasionally, secondary side effects from low blood cell counts, such as infection or bleeding, can be more severe, although these are more rare, and usually managed even when they do occur. The two-week total treatment period for RIT



is also much shorter than other cancer treatments, which can include daily radiation therapy for six weeks and four to six courses of chemotherapy administered over three or four weeks.

By contrast, chemotherapy and radiation therapy are non-targeted therapies that can kill both cancer cells and normal, healthy cells. These may be often accompanied by side effects including nausea, vomiting, hair loss, diminished white blood cell and platelet counts, and a loss of energy. Although some of these symptoms are also present with RIT, they tend to be less severe.

Studies have shown that patients with resistant or refractory B-cell non-Hodgkin lymphoma treated with RIT benefit from a prolonged remission.

## **Is radioimmunotherapy safe?**

All therapies, including RIT, have side effects and risks, and RIT should only be used for specific situations. You should discuss with your medical provider the risks and benefits of RIT and any other therapies you are considering, and who will help you determine whether RIT is right for you, given your medical history. Please tell your provider about any prior therapies you have received, as this can play a role in determining the best therapy and dosage.

## **Home care**

The medical facility where the RIT treatment is performed will provide you with instructions for special care to be taken at home, including important steps to take immediately afterwards, and in the days and week following treatment. These instructions can vary between different facilities, and you should refer to the treating facility to give you more details.

Generally, one can return to work right after treatment, unless otherwise specified by the treating facility. There may be additional medications that may need to be adjusted or stopped temporarily prior to and after treatment, such as blood thinners, and this will be instructed by your medical provider.

## **Special Considerations:**

### **Body Fluid Precautions**

In general, small amounts of the radionuclide can remain in the body following treatment. For patients treated with Zevalin, the Y-90 is primarily eliminated from the body through the urine. Therefore, you may be instructed to make sure that any body fluid, especially urine or feces, do not come in contact with other people or your pets. Wash hands thoroughly after bathroom use and keep the toilet thoroughly clean. These precautions may last for a short time, generally anywhere from a day up to a week, depending upon your individual circumstance.

### **Breastfeeding Mothers**

You must stop breastfeeding before you can be treated, but can resume it once instructed to do so; however, it is possible you may not be able to breastfeed your child anymore; you should discuss this with your provider before deciding on this type of therapy. You may safely breastfeed babies you have in the future.





## **Pregnancy**

RIT treatment should not be given during a known pregnancy. Tell your doctor if you are pregnant or could be pregnant, or are planning to make your partner pregnant. If you are planning to become or make your partner pregnant, ask your doctor how long you should wait after treatment. You may be advised to delay the pregnancy for at least 6 to 12 months, since the ovaries and testes may be exposed to radiation during treatment.

Immediately following treatment, it is recommended to avoid sexual activity for up to a week, or to at least use a condom to minimize exposure of radiation to your partner. There should be an avoidance of exchange of or contact with body fluid (urine, saliva, blood and stool) during that time period. Subsequently, you may want to consider using contraceptives to avoid pregnancy.

## **Radiation Detection**

Radiation detection security devices may be sensitive to the radiation levels present in patients who have recently had RIT. Ask your doctor for advice if you plan to be near radiation monitors at airports, border crossings, government buildings, hospitals, waste disposal sites, or other secure areas. If you cannot avoid these areas, your physician can provide you with a letter describing your medical treatment. This letter of explanation should include your name, contact information for the testing facility, the name of the procedure, the date of treatment and 24-hour contact information.

Discarded items that are heavily stained with urine, sweat or blood may trigger alarms at waste disposal sites. Ask your doctor for advice on how to safely dispose of these items.

\*This information meets the requirements of the U.S. Nuclear Regulatory Commission for giving printed instructions to patients following treatment with radioiodine. Your doctor may provide additional or different printed instructions in your case, which you should follow.

## **Is radioimmunotherapy covered by insurance?**

RIT is an FDA-approved therapy for the treatment of non-Hodgkin lymphoma and is covered by government and most private insurance companies, although the specific amounts vary.

## **What's new in radioimmunotherapy research and development?**

RIT is being actively investigated as a treatment for a wide variety of cancers. RIT has therapeutic potential for other types of cancers, including prostate cancer, metastatic melanoma, ovarian cancer, leukemia, high-grade brain tumors, metastatic colorectal cancer and neoplastic meningitis. Studies are also looking at the possibilities of treating serious infections, including HIV.





## ***About SNMMI***

The Society of Nuclear Medicine (SNMMI) is an international and medical organization dedicated to raising public awareness about nuclear and molecular imaging and therapy and how they can help provide patients with the best health care possible. With more than 18,000 members, SNMMI has been a leader in unifying and optimizing nuclear medicine and molecular imaging since 1954.

The material presented in this pamphlet is for information only and is not intended as a substitute for discussions between you and your physician. Be sure to consult with your physician or the nuclear medicine department where the treatment will be performed if you want more information about this or other nuclear medicine procedures.

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