

## Radioimmunotherapy (RIT)

Radioimmunotherapy (RIT) combines radiation and immunotherapy to treat different types of cancer. RIT pairs radioactive material with a manmade monoclonal antibody specific to the type of cancer cell to create an “agent.” The doctor injects the radiolabeled agent into your bloodstream where it binds to the specific cancer cells and delivers a high dose of radiation directly to the tumor.

Your doctor will tell you how to prepare for RIT. A radiation safety specialist will discuss radiation safety precautions with you. Tell your doctor if you are pregnant or breastfeeding. Discuss any recent illnesses, medical conditions, and medications you take. List any allergies, especially to anesthesia or contrast materials. Your doctor may tell you to stop taking aspirin, NSAIDs (<http://www.radiologyinfo.org>) or blood thinners before your procedure. Leave jewelry at home, and wear loose, comfortable clothing. Tell your doctor if you suffer from incontinence.



### What is Radioimmunotherapy and how is it used?

RIT combines radiation therapy (<http://www.radiologyinfo.org>) and immunotherapy (<http://www.radiologyinfo.org>) . Immunotherapy uses man made monoclonal antibodies (<http://www.radiologyinfo.org>) to recognize specific types of cancer cells and bind to their surface. Monoclonal antibodies mimic the natural antibodies (<http://www.radiologyinfo.org>) your immune system produces, to attack bacteria and viruses.

RIT pairs a monoclonal antibody with a radioactive material (<http://www.radiologyinfo.org>) (radiotracer (<http://www.radiologyinfo.org>) ) to create an agent. The doctor injects the agent into your bloodstream. The agent binds to cancer cells and delivers a high dose of radiation directly to the tumor.

RIT treats non-Hodgkin B-cell (<http://www.radiologyinfo.org>) and other sub-types of lymphoma (<https://www.radiologyinfo.org/en/info/lymphoma>) , prostate cancer (<https://www.radiologyinfo.org/en/info/prostate-cancer>) , and neuroendocrine tumors. Doctors use it for new patients and for those who do not respond to chemotherapy (<http://www.radiologyinfo.org>) or treatment with the agent Rituximab (<http://www.radiologyinfo.org>) ®. In prostate cancer, it is used in patients who become resistant to hormone treatment.

Doctors are developing new RIT agents, some of which are in clinical trials. Potential uses for RIT include treatments for melanoma, ovarian cancer, leukemia (<http://www.radiologyinfo.org>) , high-grade brain glioma (<http://www.radiologyinfo.org>) , and colorectal cancer (<https://www.radiologyinfo.org/en/info/colocarcinoma>) .

### Who will be involved in this procedure?

Your treatment team may include a radiologist, nuclear medicine physician, an oncologist, a radiation oncologist, medical physicist, a nurse or nurse practitioner, and a medical and/or radiation oncologist.

## What equipment is used?

RIT uses an intravenous (IV) catheter. It may also use a gamma camera to capture images before or after treatment. The doctor may use single-photon emission computed tomography (SPECT-CT) imaging. SPECT-CT uses a combined gamma camera and CT scanner that rotates around the body to produce detailed, three-dimensional images. A PET-CT (<https://www.radiologyinfo.org/en/info/pet>) may also be used before or after your treatment. It is an advanced combination of a nuclear medicine imaging system and a CT scan.

A gamma camera detects radiation and takes pictures from different angles. It may be mounted over or below the exam table or on a gantry. One camera may be above, and another camera may be beneath the table, or the camera may consist of a donut-shaped detector where you will lie on a bed that moves slowly through the detector for imaging.

## Who operates the equipment?

A radiologist or other doctor with nuclear medicine training will supervise your treatment. A technologist will operate the gamma camera.

## Is there any special preparation needed for the procedure?

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic (<http://www.radiologyinfo.org>) , general anesthesia (<http://www.radiologyinfo.org>) or to contrast materials (<http://www.radiologyinfo.org>) . Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners before your procedure. Tell your doctor if you have trouble emptying your bladder or have trouble with bladder control.

Women should always tell their doctor and technologist if they are pregnant or breastfeeding. Doctors generally do not treat pregnant women or children with RIT. *See the Radiation Safety* (<https://www.radiologyinfo.org/en/info/safety-radiation>) *page for more information about pregnancy, breastfeeding, and nuclear medicine imaging.*

The doctor will check your blood counts. The doctor will also confirm that your disease is not significantly impacting your bone marrow. Patients who have experience with bone marrow transplant or failed stem cell collection should not receive RIT. Your doctor may follow your blood counts after the procedure for some time to make sure your counts are normal.

A radiation safety specialist will discuss radiation safety precautions with you.

## How is the procedure performed?

Your doctor will usually treat you as an outpatient. This will require several separate visits.

Before your radioimmunotherapy, you may receive an IV dose of the antibody (without radioactive material) or an infusion of amino acids, depending on what type of cancer is being treated. The antibody attaches to non-malignant B cells (<http://www.radiologyinfo.org>) in your body and the amino acid infusion protects your kidneys from the radiation that RIT uses. The IV infusions may take up to two hours. The radioimmunotherapy will be given via intravenous infusion. You will be asked to use the bathroom before and after the procedure. Depending on the type of cancer being treated, the therapy may last anywhere from 2 hours to 6 hours. Your doctor will explain the procedure to you with more detailed information specific to your cancer.

## What will I feel during this procedure?

Except for intravenous injections, RIT is relatively painless. Reports of significant discomfort or side effects are rare. You will feel a slight pin prick when the technologist inserts the needle into your vein for the intravenous line. You may feel a cold sensation

moving up your arm when they inject the radiotracer. Generally, there are no other side effects.

## Are there side effects from the procedure?

There is a small risk of bone marrow damage. Lower blood counts are the most serious side effect. This may occur as late as several months after treatment. It is important to follow up with your doctor regularly because it may lead to bleeding or infection. Frequent blood draws will help monitor your blood counts.

Other side effects may include allergic reaction, fever, chills, low blood pressure, diarrhea, and rash. These possible side effects are usually short-term.

Hypersensitivity reactions from the monoclonal antibodies are rare. However, the risk of reaction increases with the number of treatments. Typically, your doctor will pretreat you with acetaminophen (Tylenol®) or diphenhydramine (Benadryl®).

## Disclaimer

This information is copied from the RadiologyInfo Web site (<http://www.radiologyinfo.org>) which is dedicated to providing the highest quality information. To ensure that, each section is reviewed by a physician with expertise in the area presented. All information contained in the Web site is further reviewed by an ACR (American College of Radiology) - RSNA (Radiological Society of North America) committee, comprising physicians with expertise in several radiologic areas.

However, it is not possible to assure that this Web site contains complete, up-to-date information on any particular subject. Therefore, ACR and RSNA make no representations or warranties about the suitability of this information for use for any particular purpose. All information is provided "as is" without express or implied warranty.

Please visit the RadiologyInfo Web site at <http://www.radiologyinfo.org> to view or download the latest information.

**Note:** Images may be shown for illustrative purposes. Do not attempt to draw conclusions or make diagnoses by comparing these images to other medical images, particularly your own. Only qualified physicians should interpret images; the radiologist is the physician expert trained in medical imaging.

## Copyright

This material is copyrighted by either the Radiological Society of North America (RSNA), 820 Jorie Boulevard, Oak Brook, IL 60523-2251 or the American College of Radiology (ACR), 1891 Preston White Drive, Reston, VA 20191-4397. Commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is prohibited.

Copyright © 2025 Radiological Society of North America, Inc.