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*She has a specific interest in smoothing the cancer patient's pathway through diagnosis, treatment and follow-up, particularly by providing understandable information to help overcome anxiety.*

# Radiotherapy

*Revised by Wendy Green, taken from an original article by Julie Mead, published in Lymphoma News issue 28 1996.*

## Why radiotherapy for lymphomas?

Radiation causes damage to lymphoma cells to a greater degree than normal cells; this is the basis for the use of radiotherapy - radiation treatment - to combat lymphoma. In addition, the healthy tissue which is damaged by radiation is able to repair itself, whereas the cancerous tissue does not have this ability.

Lymphoma cells are particularly sensitive to radiation (more so than breast or lung cancer cells, for example), and so the dose of radiation needed to eradicate the diseased cells is comparatively low. Consequently, the toxic effects on the normal cells that will be included in the treatment area are kept to a minimum.

Radiotherapy is targeted at the site of primary disease and any areas of known or suspected spread. For Hodgkin's disease

there are common sites of primary disease and likely routes of spread through certain lymph node groups.

Non Hodgkin's lymphomas are less predictable in that they arise in a wider variety of sites, and can occur wherever lymphatic tissues exist, that is, anywhere in the body. They are, however, no less sensitive to radiotherapy than the lymphoma cells in Hodgkin's disease but the exact method of radiotherapy treatment will be more variable.

### Comparing chemotherapy and radiotherapy

Radiotherapy is a treatment which is delivered to precisely defined areas of the body, whereas chemotherapy is a systemic treatment whereby drugs circulate throughout the body.



Patients with lymphomas often receive both radiotherapy and chemotherapy. Whereas chemotherapy is normally given at certain intervals over many months, radiotherapy is delivered daily over a few weeks. Most radiotherapy patients are treated on an out-patient basis. Sometimes, a course of chemotherapy is given first to shrink the tumour so that the area to be irradiated is smaller.

### What does radiotherapy involve?

There are many myths about radiotherapy; what it is, how it is given and what patients have to go through during a course of treatment. Here are some facts.

- Not all hospitals have a radiotherapy department. This is because the equipment used is 'high tech', expensive, and the staff are specialised. So unless you live in a major city, you might have to travel some distance or spend some time on a ward during your course of treatment.
- Radiotherapy is essentially a very powerful, carefully focussed x-ray beam. This beam is only 'on' for the very brief time that the area of the body is being irradiated. When the beam is 'off' there is no radiation present in or around the patient. The patient does not become radioactive.
- Like an ordinary x-ray, radiotherapy is painless and cannot be seen.



*A therapy radiographer sets a patient up on a Simulator.*

- Claustrophobia is seldom a problem as the treatment room is usually quite spacious and the machine does not form a ring, or tube, around the patient.
- When radiotherapy was first used as a treatment for cancer, patients used to suffer severe burns from the treatment. Nowadays, the machines and treatment techniques have been greatly improved and refined to minimise this side effect. Although some patients still experience a sunburn reaction in the area of skin being treated (the neck area is particularly prone to this), most people complete their treatment course with only a mild 'pinkening' of the skin, and possibly some dryness and itchiness. This heals up in due course after the treatment.



Photo courtesy of City University, London. Helen Stone

*A patient being set up in the treatment position on a Linear Accelerator*

Once it has been agreed that you are to have a course of radiotherapy, a series of events will occur. During this time, you will be under the care of a radiation oncologist or radiotherapist. This is the doctor who will decide on exactly where to target the radiotherapy, and will keep a check on you as you proceed through the course of treatment.

### First visit to radiotherapy

Before commencing radiotherapy, many investigations will have been undertaken to determine which type of lymphoma you have and exactly where in the body it is located. All this information is then used by the radiotherapy team so that your treatment is tailored to your requirements.

On your first appointment you are likely to visit a preparatory room, the Radiotherapy Simulator. This is not a treatment room, but here a number of important, precise details of your treatment are decided. In this room therapy radiographers will take several x-ray pictures by placing the machine at different angles. Then measurements of your body and the machine settings are taken, and marks are made on your skin that will be used for daily reference on the treatment machine. Most of these marks will be made with felt-tipped pens. However, for reference should you require further treatment in the future, a few permanent marks have to be made.

These are usually two or three small dots of ink just under the surface of the skin.

When having radiotherapy, the position in which you lie is very important to ensure accurate treatment. It is also important to keep as still as possible, allowing for breathing of course! Your position will be determined in the Simulator. You will be lying in an identical position when you are subsequently treated in another room. Only the clothing in the area to be treated will need to be removed.

If you are being treated for disease in the head and neck area, it is likely that you will also need to visit a Mould Room where 'shells' are made of clear, thin perspex. These shells help to keep the head still during treatment and will fit like a mask. These are very important in ensuring the radiation is targeted to precisely the right area. One advantage of a shell is that you will not need to have marks drawn on your skin as all the reference marks are transposed onto the shell.

Some people find wearing a mask quite daunting, and this is understandable. It is important to communicate your concerns to the staff as measures can be taken to make it easier for you.

These shells or 'masks' are not meant to protect the head from radiation, but rather to help direct the radiation beam to the right area. However, often it is necessary to shield healthy tissue near

the disease from the radiation. This is done by placing blocks of lead, or some other high density alloy, in the path of the radiation beam. A tray will be fixed to the head of the machine, and the blocks of lead attached to this tray in carefully demarcated positions.

### Planning

During this part of the procedure, the patient does not actually have to be present. The work is going on 'behind the scenes' using all the information obtained during your visit to the Simulator.

All the information from the Simulator and Mould Rooms will be collated and calculations performed to determine exactly the radiation dose to be received by the body and how much will be distributed to the diseased cells and to normal structures. Normal tissues always receive some radiation and this is why side effects arise, but the amounts received are carefully checked to be within acceptable limits. Often, very sophisticated computer software is used to do these calculations.

In addition to the Computerised Tomography (CT) scans performed to confirm diagnosis of disease, a special CT scan may be taken on a Simulator or CT scanner in the Radiotherapy Department to help precisely calculate your treatment. In total, it may take several visits to complete all of the simulation and planning procedures.

## Your treatment

Nowadays most people are treated with high energy x-rays electrically produced by a machine called a Linear Accelerator. Just like x-rays used to visualise the inside of the body, x-rays used for radiotherapy are totally invisible and painless but of a much higher energy. Linear Accelerators are excellent at delivering radiation very accurately and quickly. They are operated by therapy radiographers.

The machine is housed in a special Treatment Room. Here you will lie on a narrow 'table' while the machine is set up and aimed at the exact area of your body to be treated. To do this, the room lights will be dimmed and you will probably notice a beam of light coming from the head of the machine, as well as some red laser beams coming from various points in the room. These are simply there to assist the team to set you and the machine up in the correct position to ensure accuracy.



Photo courtesy of City University, London. Helen Stone

*The rectangle of light represents the radiation field. The linear beams are used to achieve an accurate set up.*

The length of time of exposure to radiation will only be a few minutes duration in total. However it may take between ten to twenty minutes for the radiographers to achieve the correct machine setting. Before switching the machine on, they will turn the lights up and leave the room, but will be constantly monitoring you on closed circuit television. Most rooms are equipped with cassette or CD players, and you may find it helpful to take along some music you enjoy.

Courses of treatment are normally given over several weeks with patients usually attending daily, Monday to Friday.

This can vary, however, and it should be stressed that radiotherapy is tailor-made and that a patient scheduled to receive a greater number of treatment days than someone else, does not necessarily have a more serious condition.

It is worth remembering that radiotherapy machines are highly complex and require constant maintenance. They are made to 'fail' if any parameters are even marginally out of tolerance because accuracy of treatment is imperative. You may well experience some delays and breakdowns during the course of treatment as a result of this. You will probably find this less stressful if you always make sure you take something to do, and if you keep your daily activities flexible to accommodate any delays.

## Effects of radiotherapy

Any side effects will depend on several factors:

- The area of the body to be treated.
- The dose of radiation used and the time scale over which it is delivered.
- The effects of any previous or concurrent chemotherapy.
- The general condition of the patient.

It is not true that radiotherapy always makes people feel sick or that they will suffer from hair loss. For example, if someone has a lymphoma of the skin on their leg, the radiation will not cause diarrhoea or vomiting or cause the hair on the scalp to fall out. An important rule of thumb to keep in mind is that the side effects of radiation are local to the area being treated.

- As mentioned earlier, one of the most certain side effects of radiotherapy is a skin reaction, in the treatment area, which usually takes the form of mild sunburn, often with associated dryness and itchiness.
- In addition, bone marrow producing areas might unavoidably be treated. This could lead to a drop in the blood count i.e. the number of blood cells circulating in the blood stream.
- If the mouth and/or oesophagus (passage from the mouth to the stomach) are in the treatment area this could lead to discomfort when

swallowing, a lack of saliva and a temporary loss of appetite. The thyroid gland's function may be impaired. If this is suspected, investigations will be carried out after the course of treatment and a form of hormone replacement therapy may be necessary.

- Treatment to the pelvic area may lead to an episode of diarrhoea. If this occurs, keep your fluid intake up and an over-the-counter remedy may be taken. Be sure to tell the treatment staff.
- Treatment to the abdomen may cause nausea and vomiting. This can often be avoided, or at least minimised by taking anti-sickness medication before treatment. This should be prescribed by the radiotherapist.
- It is also common for people receiving radiotherapy to feel quite fatigued as the course progresses. This is often worse if the patient has already had a course of chemotherapy. It is thought that the reason for this tiredness is partly due to the fact that many toxins are being released into the system as the tumour cells die, and the body has to work hard to rid itself of them.

In general, side effects of radiotherapy tend to become more evident towards the latter part of treatment and will probably be at a peak just after the course has finished. The effects will start to subside a few weeks later. Some patients will experience very few side effects at all. Effects of treatment are carefully monitored during treatment, and advice and medication will be available from the staff of the radiotherapy team. There are also various precautions you, as the patient, can take to minimise side effects (see overleaf).

It is common for most patients with lymphoma to attend for radiotherapy as outpatients so that they may continue to lead their lives as normally as possible. Modern technology, specialist staff and large centres of excellence in radiotherapy and oncology, along with information and available support, have helped to provide some of the most sophisticated medicine and individualised treatments available.

# How to help yourself when undergoing radiotherapy

You are likely to receive written instructions from the treatment team about skin care and other precautions you should take whilst on radiotherapy. Be sure to follow these instructions carefully and to ask the team if there's anything you are not sure about.

## Skin care

Only use the cream given to you by the staff, and not any over-the-counter creams. Apply it gently to the area treated and make sure there isn't a layer of cream on your skin when you have the treatment.

Be very gentle with your skin in the treatment area; don't cause any friction to the area by rubbing or scratching it.

Use a mild or baby soap in the treatment area, and tepid water. Pat the area dry with a soft towel, don't rub.

Do not use perfume, deodorant, strong soaps, powders or lotions on the skin of the radiotherapy site during the weeks you are receiving treatment and until any skin reaction has subsided.

Do not attach any sticking plaster or micropore to the treatment area.

Wear loose clothing and natural fibres (such as cotton) next to your skin to help minimise skin irritation.

Only use an electric shaver, if shaving is necessary in the treatment area.

Avoid exposing the skin to extremes of temperatures such as ice packs or heat pads.

Avoid exposing the treated area to sunlight during and for sometime after treatment.

Preferably keep the treated area covered. After the treatment, if it is exposed to the sun, always use a high factor sunscreen on the area. The Lymphoma Association has a leaflet entitled 'Sun Safety' which is available by calling the Helpline.

## Further tips

Maintain your fluid intake of at least 2 - 3 litres a day, to help your body function normally.

If large meals are a problem to face, eat small meals more frequently.

Avoid eating spicy and coarse foods (e.g. nuts and raw vegetables) if the mouth is sore. Alcohol will also irritate the mouth, as will hot and cold foods.

If your blood count decreases due to radiotherapy, you will be more susceptible to infection until your count recovers.

Please call the Helpline if you would like to receive a copy of the fact file 'A guide to preventing infection during neutropenia', *Lymphoma News* issue 27,

Carry on with your normal daily routine as much as possible. However, be sure to plan a rest period during your day. Tiredness can build up towards the end of treatment.

Communicate any problems, concerns or questions you may have to the treatment staff.