MACMILLAN
CANCER SUPPORT

# UNDERSTANDING RADIOTHERAPY

# About this booklet

## This booklet is about radiotherapy. It is for anyone who is having radiotherapy or has been offered it as part of their cancer treatment. You may find this booklet helpful if you are a carer, family member or friend.

The booklet explains:

- the different types of radiotherapy
- what to expect before, during and after radiotherapy
- how radiotherapy is planned and given
- some of the general side effects of radiotherapy and ways to cope with these effects.

We hope it helps you deal with some of the questions or feelings you may have. We cannot give advice about the best treatment for you. You should talk to your doctor, who knows your medical history.

## How to use this booklet

The booklet is split into sections to help you find what you need. You do not have to read it from start to finish. You can use the contents list on page 5 to help you.

It is fine to skip parts of the booklet. You can always come back to them when you feel ready.

## Quotes

In this booklet, we have included quotes from people who have had radiotherapy. Some are from our Online Community (**macmillan.org.uk/community**). Others are from people who have chosen to share their story with us. To share your experience, visit **macmillan.org.uk/shareyourstory**

## For more information

This booklet does not have detailed information about radiotherapy for every type of cancer. We have other booklets that explain more about treatment and side effects for each cancer type.

We also have more information about the side effects of radiotherapy in the following booklets:

- Managing the late effects of bowel cancer treatment
- Managing the late effects of breast cancer treatment
- Managing the late effects of head and neck cancer treatment
- Managing the late effects of pelvic radiotherapy in men
- Managing the late effects of pelvic radiotherapy in women
- Pelvic radiotherapy in men – managing side effects during treatment
- Pelvic radiotherapy in women – managing side effects during treatment.

If you have more questions or would like to talk to someone, call the Macmillan Support Line free on **0808 808 00 00**, Monday to Friday, 9am to 8pm, or visit **macmillan.org.uk**

If you would prefer to speak to us in another language, interpreters are available. Please tell us, in English, the language you want to use.

If you are deaf or hard of hearing, call us using NGT (Text Relay) on **18001 0808 808 00 00**, or use the NGT Lite app.

We have some information in different languages and formats, including audio, eBooks, easy read, Braille, large print and translations. To order these visit **macmillan.org.uk/otherformats** or call **0808 808 00 00**.

# Contents

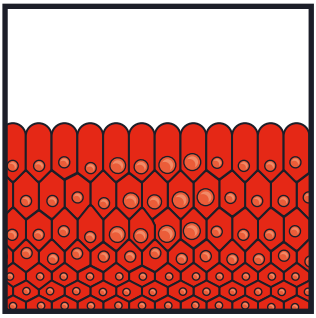
# WHAT IS RADIOTHERAPY?

# What is cancer?

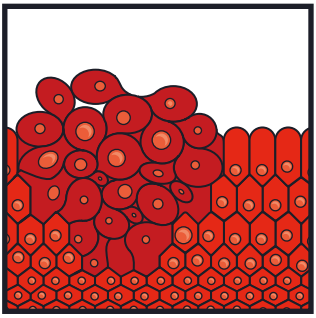
Cancer starts in cells in our body. Cells are tiny building blocks that make up the organs and tissues of our bodies. They divide to make new cells in a controlled way. This is how our bodies grow, heal and repair. Cells receive signals from the body telling them when to divide and grow and when to stop growing. When a cell is no longer needed or can't be repaired, it gets a signal to stop working and die.

Cancer develops when the normal workings of a cell go wrong and the cell becomes abnormal. The abnormal cell keeps dividing making more and more abnormal cells. These eventually form a lump (tumour). Not all lumps are cancerous. Doctors can tell if a lump is cancerous by removing a small sample of tissue or cells from it. This is called a biopsy. The doctors examine the sample under a microscope to look for cancer cells.

Normal cells



Cells forming a tumour



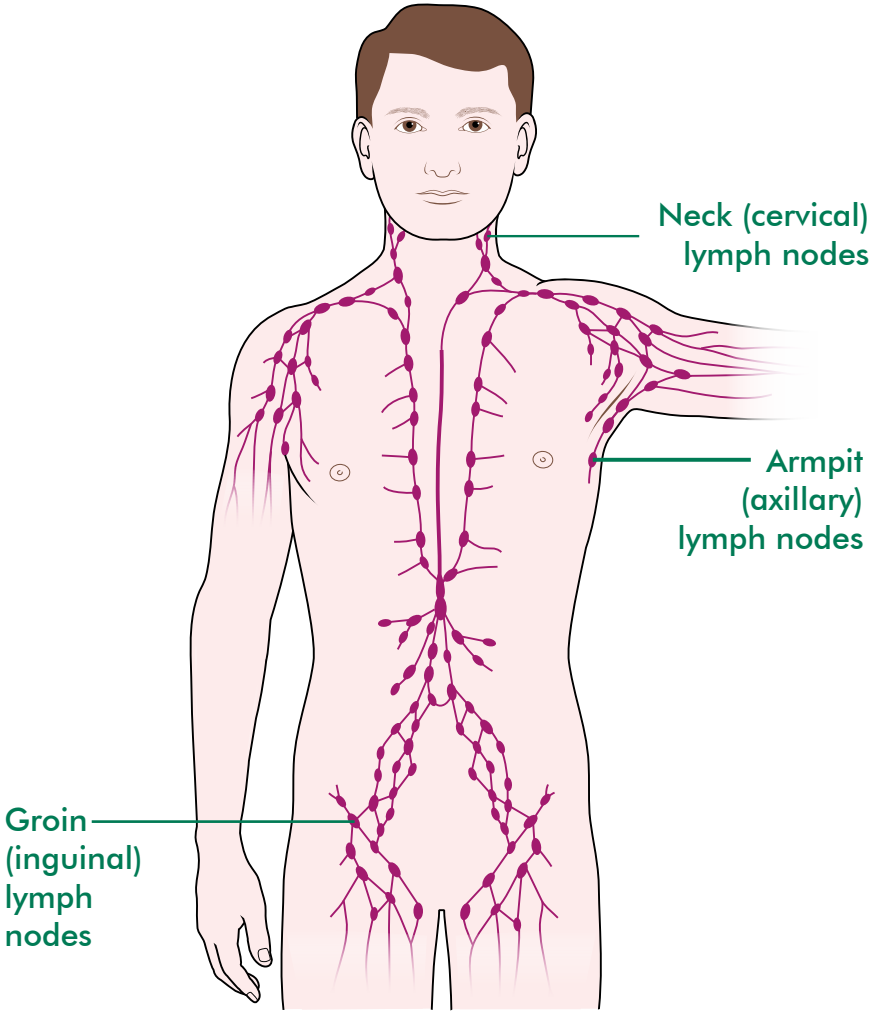
A lump that is not cancerous (benign) may grow but cannot spread to anywhere else in the body. It usually only causes problems if it puts pressure on nearby organs. A lump that is cancer (malignant) can grow into nearby tissue. Sometimes, cancer cells spread from where the cancer first started (the primary site) to other parts of the body. They can travel through the blood or lymphatic system. When the cells reach another part of the body, they may begin to grow and form another tumour. This is called a secondary cancer or a metastasis.

## The lymphatic system

The lymphatic system helps to protect us from infection and disease. It also drains lymph fluid from the tissues of the body before returning it to the blood. The lymphatic system is made up of fine tubes called lymphatic vessels that connect to groups of lymph nodes throughout the body.

Lymph nodes (sometimes called lymph glands) are small and bean-shaped. They filter bacteria (germs) and disease from the lymph fluid. When you have an infection, lymph nodes often swell as they fight the infection.

## The lymphatic system



# What is radiotherapy?

Radiotherapy uses high-energy rays, such as x-rays, to treat cancer. It destroys cancer cells in the area where it is given.

Some normal cells in the area can also be damaged by radiotherapy. This can cause side effects (see pages 66 to 85). These normal cells are usually able to repair themselves, but cancer cells cannot. As the normal cells recover, the side effects usually get better.

Radiotherapy is always carefully planned by a team of experts. Radiotherapy treatment is continuing to become even more accurate. This allows your team to treat the cancer more effectively, while doing as little harm as possible to normal cells.

## Why radiotherapy is given

Many people have radiotherapy as part of their cancer treatment. Radiotherapy is given for different reasons.

### Radiotherapy to cure the cancer

This is when radiotherapy is given to try to destroy a tumour and cure the cancer. It is sometimes called radical treatment. You may have radiotherapy on its own or sometimes with chemotherapy (chemoradiation).

Radiotherapy can be given after surgery for some types of cancer, to lower the risk of the cancer coming back. This is called adjuvant radiotherapy.

Sometimes radiotherapy is given before surgery to shrink a cancer and make it easier to remove. You may have it along with chemotherapy. This is sometimes called neo-adjuvant radiotherapy.

### Radiotherapy to treat symptoms (palliative radiotherapy)

This is when radiotherapy is given to shrink the cancer and help with symptoms such as pain or coughing. Doctors may suggest this treatment to help control the cancer for longer when curing the cancer is not possible.

## Ways of giving radiotherapy

There are two ways of giving radiotherapy:

- **External beam radiotherapy** is given from outside the body (externally) by a radiotherapy machine.
- **Internal radiotherapy** is when a radioactive material is placed inside the body. It is sometimes called brachytherapy or radioisotope therapy.

How you are given radiotherapy will depend on the type of cancer you have and where it is in the body. Some cancers are treated with both external and internal radiotherapy. Radiotherapy treatment is planned carefully for each person. This means that even if you know someone with the same type of cancer as you, their radiotherapy treatment may be different.

### Chemoradiation

Sometimes chemotherapy is given at the same time as radiotherapy. This is called chemoradiation or chemoradiotherapy. Chemotherapy uses anti-cancer (cytotoxic) drugs to destroy cancer cells. The chemotherapy drugs can make cancer cells more sensitive to radiotherapy. This can help the radiotherapy to work better. This is only helpful for certain types of cancer, so it is not suitable for everyone.

Giving chemotherapy and radiotherapy together can make the side effects of treatment worse. Your doctor, radiographer or specialist nurse can give you more information about chemoradiation and the possible side effects.

## Where radiotherapy is given

You usually have radiotherapy in a hospital that has a major cancer treatment centre. This means you may have some treatment at your local hospital, such as surgery or chemotherapy. But you may have radiotherapy at a different hospital.

You usually have external beam radiotherapy as an outpatient. If you are unwell, or are having chemotherapy at the same time, you may need to stay in hospital. In this case, you will go to the radiotherapy department each day from the ward.

If you are having some types of internal radiotherapy, you may have to stay in hospital for a few days.

# Radiotherapy team

A team of specialists are involved in planning and giving your radiotherapy. Here are some of the people you may meet.

## Consultant clinical oncologist (cancer doctor)

A consultant clinical oncologist is a doctor who is an expert in using radiotherapy and chemotherapy to treat people with different types of cancer. They specialise in planning and overseeing your course of treatment.

You may see a consultant clinical oncologist before, during and after your course of radiotherapy. Sometimes you may see a doctor from their team instead, such as a registrar. They are also very experienced in treating cancer. If you have any problems between appointments and need to see the doctor, the radiographers or nurses will arrange another appointment for you.

## Therapeutic radiographers

Therapeutic radiographers are experts in radiotherapy and are specially trained in giving you your treatment. They can also give you support, advice and information about your radiotherapy. They will:

- help plan your treatment
- help you get into the right position for treatment
- operate the radiotherapy machine to give you your treatment
- give you information, practical care and support throughout your treatment.

You will get to know a team of radiographers during your treatment. You can discuss any worries about your treatment with them.

## Consultant therapeutic radiographer

Consultant radiographers are experts in treating specific types of cancer with radiotherapy. They specialise in planning and giving radiotherapy and providing support. You may see a consultant radiographer instead of the clinical oncologist before and during your course of radiotherapy.

## Other specialist radiographers

You may see other radiographers who can give you expert advice and support during and after your treatment. For example, you might see a treatment review radiographer or an information and support radiographer.

## Radiologist

A radiologist is a specialist doctor who will look at your scans with your consultant and help plan your treatment.

## Physicist

A physicist is a radiation expert who helps plan your treatment. They work out the amount of radiation you need and the best way of giving it.

## Nurses

Many cancer centres have specialist cancer nurses. They are sometimes called clinical nurse specialists (CNSs) or advanced nurse practitioners. They have expert knowledge about the type of cancer you have.

Some radiotherapy clinics have nurses who give information about the treatment and its side effects. They may also give advice on skin care and medicines to manage side effects.

## Your key worker

Your key worker is the person to contact if you need more information or support. Usually, one radiographer or specialist nurse in your team is your key worker. If you were referred from another hospital, your key worker may be based there. If you are not sure who your key worker is, ask someone at your next appointment.

## Other health professionals

Other types of health professionals may be involved in your care. Who you may meet depends on which type of cancer you have and what help you need. They may include:

- a dietitian
- a speech and language therapist
- a physiotherapist
- an occupational therapist
- a symptom control team (palliative care team)
- a social worker
- a counsellor.

# Before your treatment

## Giving consent

Before you have any treatment, your doctor will explain its aims. They will usually ask you to sign a form saying that you give permission (consent) for the hospital staff to give you the treatment. No medical treatment can be given without your consent, and before you are asked to sign the form you should be given full information about:

- the type and extent of the treatment
- its advantages and disadvantages
- any significant risks or side effects
- any other treatments that may be available.

If you do not understand what you have been told, let the staff know straight away, so they can explain again. Some cancer treatments are complex, so it is not unusual to need repeated explanations. It is a good idea to have a relative or friend with you when the treatment is explained, to help you remember the discussion. You may also find it useful to write a list of questions before your appointment.

People sometimes feel that hospital staff are too busy to answer their questions, but it is important for you to know how the treatment is likely to affect you. The staff should be willing to make time for your questions.

You can always ask for more time if you feel that you can't make a decision when your treatment is first explained to you.

You are also free to choose not to have the treatment. The staff can explain what may happen if you do not have it. It is essential to tell a doctor or the nurse in charge, so they can record your decision in your medical notes. You do not have to give a reason for not wanting treatment, but it can help to let the staff know your concerns so they can give you the best advice.

## Research – clinical trials

Some people are offered radiotherapy as part of a research trial. Research trials are used to find new and better treatment for cancer. Taking part in research is completely your decision. Your team will explain what it involves.

We have more information about clinical trials in our booklet **Understanding cancer research trials (clinical trials)** (see page 96).

## Pregnancy

It is important that you do not get pregnant during your treatment. This is because radiotherapy given during pregnancy could harm a developing baby. Your doctors will be able to give you more information about this.

Before you consent to having radiotherapy, you will need to confirm that you:

- are not pregnant – you may need to provide a urine sample for a pregnancy test
- understand you should avoid getting pregnant during treatment – this means you will need to use a reliable form of birth control.

If you think that you may be pregnant at any time during your treatment, tell the doctors and radiographers straight away.

If you would like to have children in the future, talk to your doctor or specialist nurse before you start treatment. They can explain if there is a risk of the radiotherapy affecting your ability to have children (fertility). They can also discuss possible options of preserving your fertility.

We have more information about fertility in women in our booklet **Cancer treatment and fertility – information for women** (see page 96).

## Making someone pregnant

It may also be important that you do not make someone pregnant during treatment, and for a few months after it has finished. You can ask your doctors for more information about this.

If you would like to have children in the future, talk to your doctor or specialist nurse before you start treatment. They can explain if there is a risk of the radiotherapy affecting your ability to have children (fertility). They can also discuss possible options of preserving your fertility.

We have more information about fertility in men in our booklet **Cancer treatment and fertility – information for men** (see page 96).

## If you have a pacemaker, implantable cardiac device (ICD) or cochlea implant

If you have a pacemaker, ICD or cochlea implant (a hearing implant in your ear), you must tell your doctor or radiographer before or during your first planning appointment. Radiotherapy can affect how these devices work, so your treatment has to be planned to allow for them.

# Planning your treatment

Before you start your treatment, it needs to be planned. This is to make sure that the radiotherapy is aimed precisely at the cancer. This will also mean it causes the least possible damage to the surrounding tissue. Your radiotherapy team will plan your radiotherapy carefully.

Some people may need to have a mould or mask made before treatment planning (see page 27).

## First planning visit

Your first planning visit usually takes 30 to 60 minutes, although it may take longer. Sometimes it may take more than 1 visit.

Your radiotherapy team tell you what to expect. They also tell you if there is anything you need to do to prepare. For example, you may be asked to follow a special diet or drink plenty of water.

It is important that you feel involved in your treatment. So feel free to ask as many questions as you need to.

You will usually have a CT scan of the area to be treated. This helps plan the precise area for your radiotherapy. Before your scan, the radiographer may ask you to change into a hospital gown.

A CT scan takes lots of pictures from different angles to build up a 3D picture of the inside of your body. During the scan, you may have an injection of dye into a vein. This allows different areas of the body to be seen more clearly. You may also be asked to have a full or empty bladder for the scan.

Some people will also have an MRI scan or a PET scan. MRI scans use powerful magnets to give a very detailed picture of the area that needs treating. PET scans use low-dose radioactive glucose (a type of sugar) to measure the activity of cells in different parts of the body. Your healthcare team will tell you more about these scans. We also have more information about these scans on our website (see page 96).

During your scan, you need to lie still on a hard couch (sometimes called a table). Your head, arms and legs may be supported with moulded plastic, foam or rubber cushions. If you have a mould or mask, it will also be carefully fitted to help you lie still.

If you feel uncomfortable, tell the radiographers so they can make you more comfortable. This is important. The radiographers record the details of your position. You need to be able to lie in the same position for your radiotherapy treatment.

The information from the scan is sent to a planning computer. Your radiotherapy team use this to work out the precise dose and area of your treatment.

‘It was a very unusual experience. You had to lie really still while they put warm plastic on your face. And it moulded exactly to your features.’

Claire, diagnosed with a brain tumour

## Radiotherapy moulds and masks

You may need to have a mould or mask made before radiotherapy planning starts. This is to help you stay still and in the correct position during your radiotherapy. Moulds keep a leg, arm, or other body part still during planning and treatment. Masks may be used for people having radiotherapy to the brain, head or neck.

Moulds and masks are made of a plastic mesh. The mesh is warmed and put on to your face or other body part, so that the plastic gently moulds to fit the area being treated. Your mould or mask should fit tightly, but it should not be uncomfortable. The mesh takes a few minutes to harden. It is then taken off and is ready to be used when you have your treatment.

You may feel very nervous or claustrophobic if you have to wear a mask for treatment. But remember, you only wear it for short periods of time during planning and your radiotherapy. You can breathe normally while you are wearing it.

Most people cope well with the support of the radiotherapy team. If you are worried or uncomfortable, let them know so they can help you. Sometimes your doctor can give you medication to take before the treatment to help you relax. But this is not usually needed.

We have more information about radiotherapy masks if you are having treatment to your brain, head or neck on our website (see page 96).

‘The radiotherapy team measured and fitted the mask. They did scans to work out exactly where they wanted to aim the radiotherapy.’

Gary, diagnosed with mouth cancer

## Skin markings

You may have markings made on your skin to help the radiographers position you accurately for treatment.

Usually, tiny permanent markings are made in the same way as a tattoo. The marks are the size of a pinpoint and are only made with your permission. It can be a little uncomfortable while they are being made, but it makes sure that the treatment is directed accurately. If you have a mould or mask, the marks may be made on this.

If you are concerned about having permanent marks, let your radiographers know. They can discuss other options with you.

## Skin care

Before your treatment starts, your radiotherapy team will give you advice about looking after your skin. This will depend on the type of treatment you are having and the area of your body being treated.

During your radiotherapy, you will need to take extra care of the skin in the area that is being treated. This is because radiotherapy may cause a skin reaction (see pages 72 to 73).

If you swim, ask your radiotherapy team whether you should avoid swimming. They may advise you to wait until a few weeks after you finish your treatment.

## Other things to think about

Here are some other things to think about before you start your radiotherapy.

### Help at home

Feeling tired is a common side effect of radiotherapy, so you may need help with day-to-day tasks. Although it can be hard to ask for help, family and friends are usually keen to do whatever they can. If you live alone or are caring for someone else, you can ask to see a hospital social worker. They can help you find out if there is any help available.

### Getting to your appointments and travel costs

You may want to drive yourself to hospital for your treatment. But remember, you may feel more tired as your treatment progresses. If you feel tired, it is best to ask a family member or friend if they can drive you.

If you are worried about getting to the hospital, let the staff in the radiotherapy department know. They may be able to arrange transport for you. Some local support groups and charities also provide transport. We have more information about getting help in our booklet **Help with the cost of cancer** (see page 96).

If you have difficulty paying for your travel, you may be able to get help with travel expenses. Some hospitals may offer parking permits, or reduced parking charges. They may also refund the cost of parking if you are having daily radiotherapy treatment.

You may have a long journey to the hospital. Some hospitals offer hotel accommodation where you can stay overnight. However, you may have to pay for this.

## Planning meals and snacks

Treatment and travelling to and from hospital can be tiring. Eating may be the last thing you think about on busy days. But it is important to eat and drink well during your course of radiotherapy.

If you can, plan ahead. Take snacks and drinks with you to hospital on your treatment days. Shop before your treatments so there is food at home. Choose meals that are easy to prepare or make meals you can freeze for later.

## Smoking

Research shows that stopping smoking may make radiotherapy treatment more effective. It can also reduce the side effects of treatment.

If you smoke, try to stop. Many hospitals provide help or advice on how to quit smoking. Ask your clinical oncologist, radiographer, or specialist nurse if your hospital provides this service.

If they do not, your GP, a pharmacist or the NHS Smoking Helpline will be able to help (see page 103).

## Work and study

If you are working or you are a student, it is a good idea to talk to your employer or tutors. They can make arrangements to support you and organise your time off during treatment.

# Questions to ask about your radiotherapy

It is important to understand your treatment and the effects it may have on you. The team looking after you will be able to answer your questions. You might want to ask some of these questions:

- What type of radiotherapy will I have? Does it have any other names?
- Why am I having this type of radiotherapy?
- What are the aims of the treatment?
- How long will my course of treatment take?
- How often will I need to have treatment?
- What are the likely side effects of the treatment?
- Could there be any serious, long-term or late effects of the treatment (see pages 84 to 85)?
- Are there other types of radiotherapy I could have?
- Are there any other treatments I could have instead of radiotherapy?
- How will the treatment affect my life? Will it affect my daily activities, work, sex life or fertility?
- Will I have follow-up appointments? If so, how often and who will they be with?
- Who should I contact if I need more information or have questions about my treatment?

# EXTERNAL RADIOTHERAPY

# What is external beam radiotherapy?

External beam radiotherapy is given from a radiotherapy machine outside the body.

This treatment is normally given as a number of short, daily treatments in a radiotherapy department. These are called treatment sessions or fractions. It is given using a machine that looks like a large x-ray machine or CT scanner. There are different types of radiotherapy machine. The most commonly used machine is called a linear accelerator (LINAC).

You usually have external beam radiotherapy as an outpatient. The number of treatment sessions you have will depend on the type of cancer you have and the aim of the treatment. Your doctor, radiographer or nurse will explain the treatment plan to you. This includes how many treatment sessions you will have, and when you will have them.

Being positioned for external beam radiotherapy

## Curative (radical) radiotherapy

The term radical radiotherapy is used when doctors are hoping to cure the cancer. It usually involves having several treatment sessions. This is called a course of treatment.

You usually have one session of radiotherapy a day, often with a rest at the weekends. Some radiotherapy departments give treatment at the weekend. This means you would have rest days during the week instead. For certain types of cancer, treatment is given up to 3 times a day.

The treatment may last between 1 and 8 weeks.

Giving the treatment in several sessions means that normal healthy cells have time to recover between treatments. You may have curative radiotherapy:

- on its own
- before or after other treatments such as surgery
- before, after or along with other treatments such as chemotherapy or hormone therapy.

## Palliative radiotherapy

Palliative radiotherapy may be used to help shrink the cancer and to control symptoms. For example, you may have it to help:

- control pain caused by cancer that has spread to the bones
- reduce coughing caused by cancer in the lungs
- control bleeding caused by certain types of tumour.

If you are having palliative radiotherapy, you may have 1 to 2 sessions of treatment. Sometimes you may have a course of up to 10 to 15 sessions. For some types of brain tumour, it can be up to 30 sessions. How many treatment sessions you have depends on your situation and the type of cancer you have.

# Having external beam radiotherapy

## Treatment sessions

Usually, each radiotherapy appointment takes about 10 to 30 minutes, although you may be in the department for longer. The treatment itself usually only takes a few minutes. Most of the appointment is spent getting you into the correct position and checking your details.

Before your first treatment, the radiographers explain what you will see and hear. It is normal to feel a bit nervous about having your treatment. But, as you get to know the staff and understand what to expect, it usually gets easier. You can talk to the staff about any worries you have.

'I got used to the radiotherapy very quickly. After the first few sessions, it was fine. I knew what to expect and it wasn't as scary as I thought it would be.'

**Frances**

## Positioning you for treatment

Before your treatment, the radiographer may ask you to change into a hospital gown. This is so they can easily reach the marks on your skin (see page 29) that show the treatment area.

The radiographers help you onto the treatment couch, and position you carefully. They also adjust the height and position of the couch. They will talk you through what they are doing.

The radiographers look at the marks on your skin (or on your mask or mould, if you have one). This is to help get you in the same position you were in for your planning scan. They help you arrange your clothes or gown so that the area of your body being treated is bare. They are careful to protect your privacy so that nobody else can see you.

It is important that you are comfortable, as you have to lie as still as possible during the treatment. Let the radiographers know if you are not comfortable. The room may be quite dark to help the radiographers while they are getting you into the correct position.

Your radiographers will tell you how long your treatment will take. When you are in the correct position, they leave the room and you are given your treatment. There is a camera, so they can see you from outside the room. There is usually an intercom, so you can talk to them if you need to during your treatment.

## During treatment

The radiotherapy machine does not usually touch you. But if you are having radiotherapy for some types of cancer, it may gently press against your skin.

The treatment itself is painless. You may hear a slight buzzing noise from the radiotherapy machine while you are having the treatment.

Some treatment rooms have music players so you can listen to music to help you relax. If you would like to listen to your own music, ask your radiographers if this is possible.

Most curative (radical) radiotherapy involves having treatment from several different directions. To do this, the radiotherapy machine may move around you into different positions during your radiotherapy. This may happen several times and you will need to stay lying still. Sometimes, the radiographers will come into the treatment room during your treatment to change the position of the machine.

The radiotherapy machine may take pictures (x-rays or CT scans) of the treatment area during your treatment. They may be taken on the first day and again on other days. These pictures are used to help make sure the treatment is given accurately. They are not used to show how well treatment is working, as treatment takes time to work.

Once your treatment session has finished, the radiographers will come and help you off the treatment couch. It is important to wait until they tell you it is ok to move. Then you can get ready to go home, or back to the ward if you are having treatment as an inpatient.

External beam radiotherapy does not make you radioactive. It is safe for you to be with other people, including children, throughout your treatment. It is also safe to have sex. We have more information about having sex during treatment in our booklets **Cancer and your sex life – information for men** and **Cancer and your sex life – information for women** (see page 96).

'Although you are alone when it's being given, the staff are watching and listening all the time. I had 3 sessions lasting 6 minutes each, with no pain and no immediate side effects.'

**Lynda**

# Types of external beam radiotherapy

There are different ways of having external radiotherapy. How you are given your treatment will depend on:

- the type of cancer you have
- the part of the body that needs treating.

Your clinical oncologist or radiographer can tell you more about these treatments and whether they are suitable for you. If a type of radiotherapy is not available at your local hospital, they may arrange for you to have it at another treatment centre.

## Conformal radiotherapy

Many types of external beam radiotherapy are conformal. This means the beams are specially shaped to fit the treatment area.

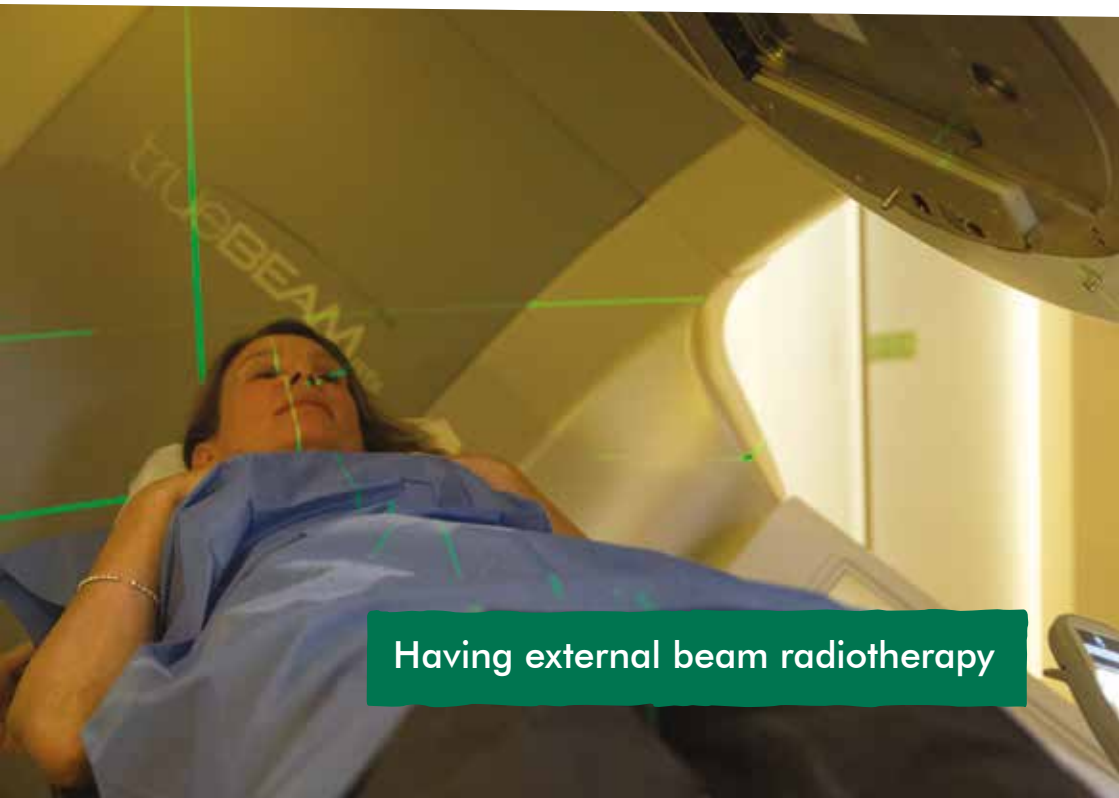
Conformal radiotherapy can be used to treat many different types of cancer.

## Intensity-modulated radiotherapy (IMRT)

IMRT shapes the radiotherapy beams and allows different doses of radiotherapy to be given to different parts of the treatment area. This means lower doses of radiotherapy are given to the healthy tissue surrounding the tumour. This can help reduce the risk of side effects and late effects. It may also allow higher doses of radiotherapy to be given to the tumour.

IMRT is often used to treat tumours that are close to important organs or structures. This is because it may reduce damage to healthy tissue and side effects. For example, it may be used to treat pelvic tumours because it can reduce the risk of long-term bowel problems. IMRT may also be used for head and neck tumours. This is to reduce damage to the salivary glands and the risk of having a dry mouth permanently.

Many treatment centres in the UK provide IMRT. It is mainly used to treat breast, head and neck, anal, prostate, bladder, gynaecological and lung cancers.



Having external beam radiotherapy

## Volumetric-modulated arc therapy (VMAT)

VMAT is a newer way of giving IMRT. It is sometimes called RapidArc®. The radiotherapy machine moves around you and reshapes the beam during treatment. This makes it more accurate and shortens the treatment time.

## Image guided radiotherapy (IGRT)

IGRT uses the pictures from scans taken before, and sometimes during, each treatment. The pictures are compared to those taken during the planning scan to check your position and the treatment area.

IGRT is helpful for treating tumours in areas of the body that change shape or position during or between treatment sessions. For example, it may be used to treat the prostate or cervix. This is because their positions can change if you have a full bladder or bowel on the day of your treatment. IGRT means the radiographers can adjust the treatment area before each treatment. This makes the radiotherapy very precise.

## 4D radiotherapy (four-dimensional radiotherapy)

4D radiotherapy uses a radiotherapy machine that takes pictures during your treatment. The pictures show any movement of the tumour.

4D radiotherapy is helpful for treating tumours in areas of the body that move during treatment. For example, these could be tumours in the lung that move as you breathe. The radiotherapy team use the information from the pictures to adjust the radiotherapy treatment area during your treatment.

This treatment is not yet available in all radiotherapy centres.

There are other ways to help reduce movement in the treatment area. Your radiographer may show you some breathing techniques. Or they may use gentle compression on your tummy area, depending on where you are having treatment. They will do this during planning and treatment. It helps to reduce movement in the area being treated. This allows them to treat the area more accurately.

## Stereotactic radiotherapy

Stereotactic radiotherapy uses many small beams of radiation to target the tumour. This makes it very precise. It means high doses of radiotherapy can be given to very small areas of the body. This can reduce the risk of side effects.

Stereotactic radiotherapy is used to treat different types of tumours. You may be offered this treatment as part of a research trial (see page 21).

This treatment may not be available in all radiotherapy centres. Your radiotherapy team will give you more information if this treatment is suitable for the type of cancer you have.

We have more information about stereotactic radiotherapy on our website (see page 96).

## Total body irradiation (TBI)

TBI treatment is when a large single dose of radiation, or 6 to 8 smaller doses, is given to the whole body. This type of radiotherapy is not used very often. It is sometimes given to people who are having a stem cell transplant.

We have more information about TBI in our booklets **Understanding donor stem cell (allogeneic) transplants** and **Understanding high-dose treatment with stem cell support** (see page 96).

## Proton beam therapy

Proton beam therapy uses proton radiation rather than x-rays to destroy cancer cells. Proton beams can be made to stop when they reach the area being treated. This is different to standard radiotherapy beams, which pass through the area and some healthy tissue around it. Using proton beam radiotherapy may help to reduce side effects and the risk of long-term effects.

Proton beam therapy is only suitable for a small number of people. It is available at the Clatterbridge Cancer Centre in Wirral to treat tumours of the eye.

It will be available for certain other types of cancer at the Christie Hospital in Manchester from late 2018 (**christie.nhs.uk**). It will also be available at University College Hospital in London from 2020 (**uclh.nhs.uk**). Until these treatment centres are fully available, some people who need this type of radiation may be able to have it in America or Europe, paid for by the NHS.

Your radiotherapy team will give you more information if proton beam therapy is suitable for the type of cancer you have.

## Intraoperative radiotherapy

Intraoperative radiotherapy is when a single dose of radiation is given during surgery to remove a cancer. It is given in the operating theatre.

This treatment is still being researched and may only be available as part of a research trial. It may be an option in some situations. For example, it may be used for women with early breast cancer who would normally have radiotherapy after surgery.

Daloni, diagnosed with womb cancer

# INTERNAL RADIOTHERAPY

# What is internal radiotherapy?

Internal radiotherapy uses a radioactive material that is put inside the body to treat cancer. This is called:

- brachytherapy, when a solid material is used
- radioisotope or radionuclide therapy, when a liquid is given by mouth or injection (see pages 60 to 63).

'For my first brachytherapy treatment, I was put under an anaesthetic and sedated, so I couldn't feel from my waist down. I drifted off into a deep sleep during the prep.'

**Danielle**

# Brachytherapy

Brachytherapy uses radioactive implants such as seeds, pellets, wires or plates that are put near or inside the tumour. The radioactivity only affects tissue that is very close to the implant. This means the tumour is treated, but healthy areas around it get much less radiotherapy. Areas of the body that are further away are not affected at all.

The implants are left in place to give the correct dose of treatment. Depending on the type of brachytherapy, this may take a few minutes or a few days. Some types of implants are designed to be left in the body permanently.

Your team will explain your treatment plan. This may also involve external beam radiotherapy (see pages 36 to 49) or other treatments such as chemotherapy, hormonal therapy or targeted therapy. Brachytherapy is mainly used to treat cancers in the prostate, cervix and womb. It is sometimes used to treat other cancers, such as cancer of the vagina, vulva, oesophagus (gullet), lung and rectum.

‘The staff who performed the brachytherapy were amazing. Very kind, supportive and gentle. They really made me feel looked after.’

**Daloni**

## Radiation safety during brachytherapy

Your treatment is planned to give you the amount of radiation needed to treat the cancer safely and effectively. Your team are also careful to protect people around you from radiation. Safety measures may be slightly different in different hospitals. Your team will explain what to expect.

During your treatment in hospital you may be looked after in a single treatment room. This depends on the type of brachytherapy you have. You may need to be alone in the room at times. Tell your team if you are worried about this so they can help.

As soon as the implants are removed from your body, there is no risk to people around you. You are not radioactive.

For some types of brachytherapy, the implants are not removed (for example, permanent seed implants or SIRT) – see next page. The radiation from each implant is absorbed by the area of the body closest to it. It is safe for you to be around most other people. As a precaution, you may have to avoid close contact with children or pregnant women for a time. Your team will explain this and any other safety measures to you. They will give you information about your treatment to carry with you at all times.

## Brachytherapy for prostate cancer

There are two ways of giving brachytherapy for prostate cancer. We have more about both these treatments in our information about prostate cancer (see page 96).

### Permanent seed implants

Permanent seed implant treatment is sometimes known as low-dose-rate (LDR) brachytherapy. Small radioactive seeds are put into the prostate under a general anaesthetic or spinal anaesthetic (an injection of painkillers into your spine). The seeds are not removed. They are left inside the body permanently and release radiation slowly. The seeds become less radioactive over several months.

### High-dose-rate (HDR) brachytherapy

HDR brachytherapy is given under a general or a spinal anaesthetic. Thin hollow needles are put through the skin and into position in the prostate.

The ends of the needles outside the body are connected to a treatment machine. The machine sends a radioactive pellet into each needle. It keeps the pellets in the needle in the prostate for up to an hour to give the treatment. When the treatment has finished, the pellets return to the machine. Sometimes 2 or 3 treatments are given over 24 hours. When all the treatment is finished, the needles are removed.

## Brachytherapy for cancers of the cervix, womb, vulva and vagina

Hollow tubes are placed into the vagina. One end of each tube sits inside the vagina or womb. The other end sits outside the body between the legs. You may have a general anaesthetic or spinal anaesthetic (an injection of painkillers into your spine) if a tube is placed in the womb.

The end of the tubes outside the body are connected to a treatment machine. The machine sends a radioactive pellet into each tube. It keeps the pellets in the tubes in the vagina or womb to give the treatment. When the treatment has finished the pellets return to the machine.

This type of brachytherapy can be given as:

- high-dose-rate treatment
- low-dose-rate treatment
- pulsed-dose-rate treatment.

These methods all work equally well. The type you have depends on the system your hospital uses.

'The brachytherapy only took 6 minutes. Overall, it was a good experience. I didn't feel any pain and I was very relaxed. Recovery was okay.'

**Danielle**

High-dose-rate treatment is given over a few minutes. You have several treatments over several days or weeks. If you stay in hospital and your treatments are close together, the tubes may be left in place. They will only be removed after your last treatment. If you go home between treatments, the tubes are removed before you leave the hospital.

Low-dose-rate and pulsed-dose-rate treatments take longer. You are usually in hospital for 12 to 24 hours, or sometimes for a few days. The tubes stay in place during this time and are removed after the treatment.

We have more information about treating cervical cancer, womb cancer, vulval cancer and vaginal cancer (see page 96).

## Other cancers and brachytherapy

### Plaque brachytherapy

Eye cancer (ocular melanoma) may be treated using a small radioactive disc called a plaque. The plaque is placed near the cancer using a small operation. It is usually done under a general anaesthetic. But sometimes a local anaesthetic is used. The plaque is left in place, usually for 1 to 4 days. You have another small operation to remove it after the treatment.

We have more information about treating eye cancer on our website (see page 96).

### Brachytherapy using caesium or iridium wires

This can be used to treat cancers including lip, breast and vaginal cancer. Very thin radioactive needles, wires or tubes are inserted into the body while you are under a general anaesthetic.

Your healthcare team will give you more information if you are offered this treatment.

## Brachytherapy using an endoscope

An endoscope is a thin, flexible tube with a camera on the end. It can be used to look inside areas such as the nose, throat, airways or rectum.

Brachytherapy can be given using an endoscope to put a thin tube next to tumours in these areas. A machine then sends radioactive pellets into the tube. It keeps the pellets in the tubes in place to give the treatment. After the treatment the pellets return to the machine.

Your healthcare team will give you more information if you are offered this treatment. We have more about treating cancer of the nasopharynx, oesophagus (gullet), lungs and rectum. We have more information about these cancer types (see page 96).

## Selective internal radiotherapy treatment (SIRT)

This type of brachytherapy may be used to treat some types of liver cancer. For example, it may be used to treat cancer that spreads to the liver from the bowel. Tiny radioactive beads are injected into the bloodstream. They stick permanently in small blood vessels in and around the liver tumour. The beads give off radiation which damages the cancer cells. They also block the blood vessels to the tumour. This stops the blood supply to the tumour so it does not get the oxygen and nutrients it needs.

We have more information about SIRT on our website (see page 96).

# Radioisotope therapy

This therapy uses radioactive liquids known as radioisotopes or radionuclides to destroy cancer cells. The liquid can be given:

- by mouth as a drink or capsules
- as an injection into a vein.

Cancer cells take in the radioisotope more than normal cells do. This means they get a higher dose of radioactivity. This eventually destroys the cancer cells.

Your team will tell you how you will have your treatment and any possible side effects.

'After the doctor left [the room], it was a strange feeling. It was quite isolating. I don't think I appreciated how it would be, so having my phone was essential so that I didn't feel alone.'

**James**

## Radiation safety during radioisotope therapy

Your treatment is planned to give you the amount of radiation needed to treat the cancer safely and effectively. But your team are careful to protect other people around you from radiation. Safety measures may be slightly different in different hospitals. Your team will explain what to expect.

After treatment, your body fluids are slightly radioactive for a time. Your team will give you instructions about using the toilet and cleaning up any spilled body fluids safely. You may be advised to avoid close contact with children or pregnant women for a time.

If your treatment involves a stay in hospital, you may be cared for in a single treatment room. You may be asked to stay in your room at all times. Tell your team if you are worried about this so they can help.

Your team will tell you any other safety measures you need to follow.

## Iodine-131

This is the most common type of radioisotope therapy. It is mainly used to treat some types of thyroid cancer. It may also be used to treat other rarer neuroendocrine tumours. You usually have it as capsules or a drink. But it can also be given as an injection into a vein in the arm. You may have to stay in hospital to have this treatment.

We have more information about treating thyroid cancer in our booklet **Understanding thyroid cancer**. We also have more information about neuroendocrine tumours on our website (see page 96).

## Strontium-89 and Samarium-153

These radioisotopes can be used to treat some types of cancer that have spread to the bones (metastatic bone cancer). This treatment can help reduce bone pain and improve quality of life. You can usually go home soon after having this treatment.

We have more information about treating metastatic bone cancer in our booklet **Understanding secondary bone cancer** (see page 96).

## Radium-223

This radioisotope is sometimes used to treat prostate cancer that has spread to the bones. It may be used if hormone therapy alone is no longer controlling the cancer. You can usually go home soon after having this treatment.

We have more information about treating metastatic bone cancer. We also have more information on advanced prostate cancer in our booklet **Understanding advanced prostate cancer** (see page 96).

# SIDE EFFECTS OF RADIOTHERAPY

# Possible side effects

Your team plans your treatment carefully to reduce your risk of side effects. However most people have a few side effects during or after radiotherapy.

Side effects do not usually happen straight away. They may develop during treatment or in the days or weeks after treatment finishes. Sometimes side effects get worse for a time after you have finished radiotherapy before they get better. There may also be a small risk of side effects that are long-term or that only start months or years after radiotherapy (see pages 84 to 85).

It is difficult to predict exactly how you will react to treatment. Your team will explain what to expect. Always tell them if you have side effects during or after radiotherapy. They can give advice and support to help you cope.

These are some of the general side effects of radiotherapy. You are unlikely to get all of them. You may also get other side effects that we do not mention here. This can depend on:

- the area of your body being treated
- the type of radiotherapy you have
- other treatments you are also having, such as chemotherapy.

Radiotherapy only affects the area of the body being treated. So you may find it helpful to read our information about the type of cancer you have (see page 96). This has more detail about your treatment and the other possible side effects.


‘I had some tiredness. I still went for walks and cycles, but not as far as before.’

**Alan, diagnosed with prostate cancer**

## Tiredness

Not everyone feels tired during radiotherapy treatment, but many people do. Tiredness (fatigue) can continue for weeks or a few months after your treatment has finished. You might be more tired if you have to travel to hospital each day. Or you may also be having other treatments such as surgery or chemotherapy that make you more tired.

Some people are able to continue with their day-to-day activities, but others may find they need to rest more.

You may have 1 or 2 sessions of external beam radiotherapy to help control symptoms of advanced cancer (palliative radiotherapy) – see page 13. As well as tiredness, this might also cause some mild aches and pains. These usually settle quickly over a few days.

### Coping with tiredness

Get plenty of rest but balance this with some gentle exercise, such as short walks. This gives you more energy and keeps your muscles working. It also helps to eat a healthy diet and drink plenty of fluids.

Save some energy for doing the things you enjoy. You can also ask others for help doing chores if these are tiring you out.

We have more information about coping with tiredness in our booklet **Coping with fatigue** (see page 96).

‘For two weeks after the radiotherapy ended, I felt more and more tired than I already was.’

Claire

## Problems with eating and drinking

At times during your treatment, you may not feel like eating. Or you may find that your eating habits change. Eating a healthy diet and drinking plenty of fluids is good for your general health. It helps your body cope with treatment. Tell your team if you are finding it difficult to eat.

Radiotherapy to some areas of the body can cause more serious side effects that may make eating and drinking difficult. This includes treatment to your head, neck or gullet (oesophagus). Your team may suggest putting a feeding tube into your stomach. The tube is passed down the nose and into the stomach. This is called an NG tube. Or it can be passed through the skin and muscle of the tummy (abdomen) and into the stomach during a small operation. This is called a PEG or RIG tube.

The tube is usually put in before your treatment starts. You usually only need it for a short time. You can be fed through it if you have problems eating or drinking. When you can eat and drink again, it is taken out.

We have more information about this and about coping with side effects of radiotherapy to the head and neck in our booklet **Understanding head and neck cancers** (see page 96).

## Coping with eating and drinking problems

Tell the radiotherapy team if you are having any problems. They can give you advice. They may be able to arrange for you to talk to the hospital dietitian. The dietitian can monitor your weight and diet more closely.

Try having small, nutritious snacks throughout the day rather than large meals. If food seems tasteless, use seasoning or strong-flavoured sauces. If your mouth is dry, try sucking an ice cube or sugar-free sweet. If you are losing weight, add extra energy and protein to your diet. Or you can ask your radiotherapy team about using food supplements.

We have recipes that may help if you are losing weight during treatment in our booklet **Recipes for people affected by cancer** (see page 96).

We also have more information about coping with eating problems. You may find the following booklets helpful (see page 96):

- **Healthy eating and cancer**
- **Managing weight gain after cancer treatment**
- **Eating problems and cancer**.

## Feeling sick

Some people find radiotherapy makes them feel sick (nausea) or be sick (vomit). This is more likely if the treatment area is near the stomach or the brain. Sickness can usually be well controlled and stops once treatment is finished. Your team may give you anti-sickness (anti-emetic) drugs to prevent nausea or vomiting.

## Coping with sickness

Always tell your team if you have nausea or vomiting during or after your treatment. They can give you anti-sickness (anti-emetic) drugs or change the drugs you are taking. They will explain when and how to take the drugs. These drugs often work better when you take them regularly, or before you start to feel sick. Tell your team if the sickness does not improve.

You may find it helps to let someone else cook or prepare food for you, especially if the smell of cooking makes you feel sick. Sipping drinks slowly through a straw, drinking ginger tea, or eating crystallised ginger or ginger biscuits can also help.

We have more information about coping with feeling and being sick on our website (see page 96).

## Skin reactions

External beam radiotherapy can cause a skin reaction in the area being treated. If this happens, it usually begins after about 10 days.

You may find your skin in the treatment area becomes red or darkens. It may also feel sore or itchy. Sometimes the skin gets very sore and it may blister, break or leak fluid. Very rarely, your team may stop treatment for a short time to allow a serious skin reaction to recover.

Skin reactions can take time to improve. They are usually better about 4 weeks after your treatment has finished. The area of skin may always look or feel slightly different to the surrounding skin.

## Coping with skin reactions

During your treatment, you are usually advised to:

- wear loose-fitting clothes made from natural fibres, such as a cotton T-shirt
- wash your skin gently with mild, unperfumed soap and water and gently pat it dry
- avoid rubbing the skin
- avoid heating and cooling pads
- avoid wet shaving
- avoid hair-removing creams or products, including wax
- follow your team's advice about using moisturisers and deodorants
- avoid the sun (your radiographer can give you more information about this).

If your skin becomes sore or itchy or changes colour, let the radiotherapy team know as soon as possible. They can give you advice and treatments if needed.

When you finish radiotherapy, you should protect the skin in the treated area from strong sunshine for at least a year. Once any skin reaction has disappeared, use a sun cream with a high SPF of at least 30. Wear close-weave clothing and a wide-brimmed hat to protect your head and neck area. Remember, you can burn through clothing if you are out in hot sun for a long time. Your radiographer can give you more information about this.

You can usually go swimming once any skin reaction has disappeared. Remember to use a waterproof sun cream if you swim outdoors.

## Hair loss

Radiotherapy only causes hair loss in the treatment area. You may lose your hair where the radiation beam leaves your body as well as where it enters the body. Ask your clinical oncologist or radiographer to show you exactly where your hair is likely to fall out.

Hair may start to fall out 2 or 3 weeks into radiotherapy treatment. It usually grows back after treatment finishes. Sometimes it grows back a different texture or colour than before. It may take several months to grow back, depending on the dose of radiotherapy you have.

Rarely, hair does not grow back or is patchy. Your doctor or radiographer can tell you if this is likely with your treatment.

### Coping with hair loss

If you are worried about losing the hair on your head, it may help to read our booklet **Coping with hair loss** (see page 96). This includes tips to help you prepare if you are likely to lose your hair. Your team can give you information about getting a wig.

We also have a video about coping with hair loss. In it, Amanda, Lurline and Doug share their experiences of hair loss (**macmillan.org.uk/hairloss**).

‘When the nurse told me my hair might fall out, it was not what I was expecting. But she helped me accept that it was another thing on the list that I had to go through.’

**Claire**

## Changes in your blood

Some treatments can reduce the number of normal blood cells produced by your bone marrow (the spongy part inside some bones). This includes some types of radioisotope therapy. Sometimes, it can also happen with external beam radiotherapy, especially if you have chemotherapy at the same time.

Your blood cell levels are unlikely to cause problems and they will improve after your treatment finishes. Some people need treatment if the level of certain types of blood cells is too low.

Your team will arrange any blood tests you need during and after your treatment. Always tell your team if you have any bruising or bleeding that you cannot explain. This includes:

- nosebleeds
- bleeding gums
- tiny red or purple spots on the skin that may look like a rash.

You should also contact them straight away if:

- your temperature goes over 37.5°C (99.5°F)
- you suddenly feel unwell, even with a normal temperature
- you have symptoms of an infection – this can include feeling shaky, a sore throat, a cough, diarrhoea or needing to pass urine a lot.

# Effects on your sex life

## Sex during radiotherapy

During and after external radiotherapy, it is usually safe for you and a partner to have sex. For some types of internal radiotherapy, there may be times during and after treatment when you should avoid having sex or close physical contact. Your team will explain more.

If you have any type of radiotherapy, you should use contraception to:

- prevent pregnancy during radiotherapy and for a time after (see pages 22 to 23)
- protect yourself from infection.

There are many different types of contraception. Ask your team for advice about the safest type to use during your treatment.

## Side effects and sex

Side effects of radiotherapy can change how you feel about having sex. It is normal to be less interested in sex if you are tired, unwell or anxious. Changes such as hair loss may change how you feel about your body or make you feel less confident. For a time, men may find it difficult to get or keep an erection.

It may help to remember that most of these side effects are usually short-term and get better after you finish radiotherapy. Although it can be upsetting to lose interest in sex, things usually improve as the side effects get better.

## Pelvic radiotherapy and sex

Radiotherapy to the pelvic area can cause side effects that may make having sex difficult. Sometimes these effects can be long-term or happen months or years after radiotherapy. These are called late effects. Before you decide to have treatment, your team will tell you what side effects are likely.

The pelvis is the area between the hips in the lower part of the tummy. You might have radiotherapy to this area to treat cancer of the:

- bladder
- rectum (back passage)
- anus
- prostate
- cervix
- womb
- ovaries
- vagina
- vulva.

Side effects of pelvic radiotherapy may include the following. You can ask your team about treatments and advice that can help with these side effects. We have more information about pelvic radiotherapy for men and for women (see page 96).

### Early menopause and vaginal changes

Women who have not already had it may start the menopause. This can cause many symptoms, including vaginal dryness. Radiotherapy to the vagina or vulva can also make these areas drier and less stretchy. These side effects may mean sex is less comfortable or that it is harder to orgasm.

### Problems with erections and ejaculation

Radiotherapy to the pelvis may cause difficulties getting an erection or ejaculating. This sometimes develops months or even years after the radiotherapy has finished.

### Changes to the anus and rectum

Treatment to the anus or rectum may make these areas more fragile and less stretchy. This may make anal sex difficult or painful.

## Coping with effects on your sex life

If you find a side effect difficult to cope with during or after radiotherapy, talk to your healthcare team. You may feel embarrassed talking about it, but your team can help. They may be able to give you information or support to cope with a problem. Sometimes they can arrange for you to see other professionals, for example a specialist doctor or counsellor.

We have more information about cancer and your sex life for men and for women (see page 96). You can also find information and support about sex on the College of Sexual and Relationship Therapists website (see page 104).
If you want to talk to a cancer information nurse, call us on **0808 808 00 00**.

# Effects on fertility

Radiotherapy to most areas of the body does not affect your ability to get pregnant or make someone pregnant (your fertility).

However, your fertility may be affected if you have treatment to:

- the pelvic area – the area between the hips in the lower part of the tummy
- the pituitary gland – a small gland at the base of the brain).

Radiotherapy to these areas can affect how your body produces:

- the hormones (chemical messengers) needed to control sex
- the egg or sperm cells needed to start a pregnancy.

It can also cause physical changes that:

- make it difficult to get an erection or ejaculate
- mean you cannot get pregnant or carry a pregnancy.

Before you decide to have treatment, your team will explain any risks to your fertility. For some people, radiotherapy causes changes that get better with time. For others, the treatment they have to the pelvic area or pituitary gland causes permanent infertility.

Your team may talk to you about fertility preservation, if this is possible for you. For men, fertility preservation usually means collecting and freezing sperm. For women, it can mean collecting and freezing eggs or pieces of ovary. If you have a male partner, sometimes collected eggs can be fertilised with their sperm. If suitable embryos develop, these may be frozen.

Fertility preservation is not always possible. But it may mean some people who lose their fertility are still able to have a baby in the future. We have more information about fertility preservation for men and or women (see page 96).

## Preventing pregnancy

Even if your team tell you your fertility might be affected by the treatment, it is not always possible to know when this will happen. You may still be able to get pregnant or make someone pregnant (see pages 22 to 23).

Whatever your gender, you should use contraception to prevent a pregnancy during your radiotherapy and for a time after. Your team can give you more information about this.

## Coping with infertility

People cope with the idea of losing their fertility in different ways. You may come to terms with it quickly and feel that dealing with the cancer is more important. Or you might find that the impact does not hit you until treatment is over.

Whatever you are feeling, there is support if you want to talk or have questions. It does not matter whether you are starting cancer treatment or had treatment in the past. You may find it helps to talk things over with your partner, family, friends, or religious or spiritual adviser. If you want to talk to a counsellor, your GP or cancer doctor can help to arrange this. Fertility clinics also provide counselling.

Organisations such as the British Infertility Counselling Association (BICA) can offer support and counselling to people affected by infertility (see page 104). Talking to other people in a similar position may also help you feel less alone. Get in touch with our Online Community (see page 99).

# Late and long-term side effects

Radiotherapy is carefully planned and treatments are becoming more and more accurate. This allows your team to treat the cancer while doing as little damage as possible to other parts of the body.

However, there may still be a small risk you will have side effects that:

- do not get better after treatment – these are called long-term side effects
- only start months or years later – these are called late side effects.

This risk may be higher if you are also having other treatments, such as chemotherapy.

Before you decide to have cancer treatment, your team will explain your risk of developing these side effects. Even if it is not very likely, it is important that you understand and think about these long-term risks.

You can find more about possible long-term effects of radiotherapy in our information about the type of cancer you have (see page 96). We also have information in our booklets:

- **Managing the late effects of bowel cancer treatment**
- **Managing the late effects of breast cancer treatment**
- **Managing the late effects of pelvic radiotherapy in women**
- **Managing the late effects of pelvic radiotherapy in men.**

## Second cancers

Radiotherapy may increase your risk of developing a different type of cancer later in life. A very small number of people develop another cancer because of the treatment they had.

The chance of a second cancer is small. This risk is far less than the benefits of treating the first cancer with radiotherapy.

If you are worried about your risk of developing a second cancer, talk to your cancer doctor.

Patrick, diagnosed with prostate cancer

# LIFE AFTER RADIOTHERAPY

# Follow-up

After your radiotherapy has finished, your oncologist or radiographer explains how you will be followed up. Your follow-up depends on the type of cancer and the type of radiotherapy you had.

Your follow-up care may involve one of the following:

- You may not need follow up appointments. Instead, you might get advice about problems you should look out for and the details of someone to contact if you need to.
- You might have regular follow-up appointments at the radiotherapy department or your original hospital. These may be with the specialist who recommended the radiotherapy. The first appointment is usually 4 to 8 weeks after treatment has finished.
- A nurse or radiographer may follow-up by telephone. They will check how you are by asking you questions. If needed, they will arrange for you to have an appointment at the clinic.
- You may do patient-led follow-up. This means you do not have set appointments, but can contact the team and arrange one if you are worried. This may not be suitable for everyone. You still have any tests or scans you need as normal.

Follow-up appointments are a good opportunity to discuss any problems or worries you have. It may help to make a list of questions beforehand so you do not forget anything important. If you feel anxious, it can help to have a friend or family member with you.

Contact your clinical nurse specialist, cancer doctor or the person you have been told to contact if:

- you have any problems
- you notice any new symptoms at any time.

Do not wait until your next appointment, just ask for an earlier one.

‘I counted the days to the last radiotherapy session and expected to feel elated. Instead, I felt flat and tired. Suddenly, I didn’t have the routine of appointments.’

**Kathy, diagnosed with breast cancer**

# Well-being and recovery

You may have mixed emotions when you get to the end of your radiotherapy treatment. You will probably feel relieved, but you may also feel anxious and uncertain. Some people find they feel low after finishing the treatment. It can take time to rebuild your confidence and accept what you have been through.

It may also take time to recover from treatment. You may feel tired for a while and might have emotional changes to deal with. It is important to give yourself time to recover and adjust. You can talk to your radiotherapy team if you are worried about anything. You can also call us on **0808 808 00 00** and talk to one of our cancer support specialists. You can also ask your healthcare team for the details of local support groups that may be able to help you.

We have more information to help you with adjusting to life after treatment on our website (see page 96).

# Lifestyle changes

When your treatment is over, you may want to think about making some positive changes to your lifestyle. Perhaps you already followed a healthy lifestyle before your treatment. But you may now want to focus more on making the most of your health. There are things you can do to help your body recover. These can also help improve your sense of well-being and lower your risk of getting other illnesses and other cancers.

## Eating well

It is important to eat a well-balanced diet with plenty of fresh fruit and vegetables. You should try to do this even if you have less of an appetite or are less interested in food. We have more information in our booklet **Healthy eating and cancer** (see page 96).

## Giving up smoking

If you smoke, it is important to try to stop. Smoking can delay your recovery and increase your risk of developing a second cancer.

Giving up smoking can be difficult, but there is a lot of support available. You may find our booklet **Giving up smoking** helpful (see page 96).

## Physical activity

Physical activity can be an important part of your recovery after treatment. It can:

- help you feel better in yourself
- help increase your energy levels
- reduce the risk of heart disease, stroke and diabetes.

Talk to your cancer specialist or GP before you start exercising. Start slowly and increase your activity over time.

We have more information in our booklet **Physical activity and cancer** (see page 96).

## Complementary therapies

Complementary therapies may help you feel better and reduce any stress and anxiety. Relaxation, counselling and psychological support are available at many hospitals. Some hospitals also offer:

- visualisation
- massage
- reflexology
- aromatherapy
- hypnotherapy.

Therapies are sometimes available through cancer support groups or your GP. Many complementary therapists also have private practices.

Not all complementary therapies are suitable for people who have just finished radiotherapy. It is important to check with your healthcare team first if you are thinking of having one.

We have more information in our booklet **Cancer and complimentary therapies** (see page 96).

Alan, diagnosed with prostate cancer

# FURTHER INFORMATION

# About our information

## We provide expert, up-to-date information about cancer. And all our information is free for everyone.

### Order what you need

You may want to order more leaflets or booklets like this one. Visit **be.macmillan.org.uk** or call us on **0808 808 00 00**.

We have booklets on different cancer types, treatments and side effects. We also have information about work, financial issues, diet, life after cancer and information for carers, family and friends.

### Online information

All of our information is also available at **macmillan.org.uk/information-and-support** There you'll also find videos featuring real-life stories from people affected by cancer, and information from health and social care professionals.

### Other formats

We also provide information in different languages and formats, including:

- audiobooks
- Braille
- British Sign Language
- easy read booklets
- eBooks
- large print
- translations.

Find out more at **macmillan.org.uk/otherformats** If you'd like us to produce information in a different format for you, email us at **cancerinformationteam@macmillan.org.uk** or call us on **0808 808 00 00**.

## Help us improve our information

We know that the people who use our information are the real experts. That's why we always involve them in our work. If you've been affected by cancer, you can help us improve our information.

We give you the chance to comment on a variety of information including booklets, leaflets and fact sheets.

If you'd like to hear more about becoming a reviewer, email **reviewing@macmillan.org.uk** You can get involved from home whenever you like, and we don't ask for any special skills – just an interest in our cancer information.

# Other ways we can help you

## At Macmillan, we know how a cancer diagnosis can affect everything, and we're here to support you.

### Talk to us

If you or someone you know is affected by cancer, talking about how you feel and sharing your concerns can really help.

**Macmillan Support Line**
Our free, confidential phone line is open Monday to Friday, 9am to 8pm. Our cancer support specialists can:

- help with any medical questions you have about cancer or your treatment
- help you access benefits and give you financial guidance
- be there to listen if you need someone to talk to
- tell you about services that can help you in your area.

Call us on **0808 808 00 00** or email us via our website, **macmillan.org.uk/talktous**

**Information centres**
Our information and support centres are based in hospitals, libraries and mobile centres. There, you can speak with someone face to face.

Visit one to get the information you need, or if you'd like a private chat, most centres have a room where you can speak with someone alone and in confidence.

Find your nearest centre at **macmillan.org.uk/informationcentres** or call us on **0808 808 00 00**.

## Talk to others

No one knows more about the impact cancer can have on your life than those who have been through it themselves. That's why we help to bring people together in their communities and online.

### Support groups

Whether you are someone living with cancer or a carer, we can help you find support in your local area, so you can speak face to face with people who understand. Find out about support groups in your area by calling us or by visiting **macmillan.org.uk/selfhelpandsupport**

### Online Community

Thousands of people use our Online Community to make friends, blog about their experiences and join groups to meet other people going through the same things. You can access it any time of day or night. Share your experiences, ask questions, or just read through people's posts at **macmillan.org.uk/community**

## The Macmillan healthcare team

Our nurses, doctors and other health and social care professionals give expert care and support to individuals and their families. Call us or ask your GP, consultant, district nurse or hospital ward sister if there are any Macmillan professionals near you.

'Everyone is so supportive on the Online Community, they know exactly what you're going through. It can be fun too. It's not all just chats about cancer.'

**Mal**

## Help with money worries

Having cancer can bring extra costs such as hospital parking, travel fares and higher heating bills. If you've been affected in this way, we can help.

### Financial guidance

Our financial team can give you guidance on mortgages, pensions, insurance, borrowing and savings.

### Help accessing benefits

Our benefits advisers can offer advice and information on benefits, tax credits, grants and loans. They can help you work out what financial help you could be entitled to. They can also help you complete your forms and apply for benefits.

### Macmillan Grants

Macmillan offers one-off payments to people with cancer. A grant can be for anything from heating bills or extra clothing to a much-needed break.

Call us on **0808 808 00 00** to speak to a financial guide or benefits adviser, or to find out more about Macmillan Grants. We can also tell you about benefits advisers in your area.

Visit **macmillan.org.uk/financialsupport** to find out more about how we can help you with your finances.

## Help with work and cancer

Whether you're an employee, a carer, an employer or are self-employed, we can provide support and information to help you manage cancer at work. Visit **macmillan.org.uk/work**

## My Organiser app

Our free mobile app can help you manage your treatment, from appointment times and contact details, to reminders for when to take your medication. Search 'My Organiser' on the Apple App Store or Google Play on your phone.

# Other useful organisations

## There are lots of other organisations that can give you information or support.

### Radiotherapy organisations

**Society of Radiographers**
**Tel** 020 7740 7200
**www.sor.org**
This organisation is for professionals, but it also provides information about radiotherapy for the public. You can access some of the national guidance documents for radiotherapy from the website.

### Cancer support organisations

**Cancer Black Care**
**Tel** 020 8961 4151
**Email**
info@cancerblackcare.org.uk
**www.cancerblackcare.org.uk**
Offers UK-wide information and support for people with cancer, as well as their friends, carers and families, with a focus on those from BME communities.

**Cancer Focus Northern Ireland**
**Helpline** 0800 783 3339
(Mon to Fri, 9am to 1pm)
**Email**
nurseline@cancerfocusni.org
**www.cancerfocusni.org**
Offers a variety of services to people affected by cancer in Northern Ireland, including a free helpline, counselling and links to local support groups.

**Cancer Research UK**
**Helpline** 0808 800 4040
(Mon to Fri, 9am to 5pm)
**www.cancerresearchuk.org**
A UK-wide organisation that has patient information on all types of cancer. Also has a clinical trials database.

### Cancer Support Scotland
**Tel** 0800 652 4531
(Mon to Fri, 9am to 5pm)
**Email**
info@cancersupportscotland.org
**www.**
**cancersupportscotland.org**
Runs cancer support groups throughout Scotland. Also offers free complementary therapies and counselling to anyone affected by cancer.

### Maggie's Centres
**Tel** 0300 123 1801
**Email**
enquiries@maggiescentres.org
**www.maggiescentres.org**
Has a network of centres in various locations throughout the UK. Provides free information about cancer and financial benefits. Also offers emotional and social support to people with cancer, their family, and friends.

### Riprap
**www.riprap.org.uk**
Developed especially for teenagers in the UK who have a parent with cancer. Has an online forum where teenagers going through similar experiences can talk to each other for support.

### Tenovus
**Helpline** 0808 808 1010
(Daily, 8am to 8pm)
**Email**
info@tenovuscancercare.org.uk
**www.**
**tenovuscancercare.org.uk**
Aims to help everyone in the UK get equal access to cancer treatment and support. Funds research and provides support such as mobile cancer support units, a free helpline, benefits advice and an online 'Ask the nurse' service.

## General health information

### Health and Social Care in Northern Ireland
**www.hscni.net**
Provides information about health and social care services in Northern Ireland.

### Healthtalk

**Email**
info@healthtalk.org
**www.healthtalk.org**
**www.healthtalk.org/young-peoples-experiences**
(site for young people)
Has information about cancer, and videos and audio clips of people's experiences. Also provides advice on topics such as making decisions about health and treatment.

### NHS.UK

**www.nhs.uk**
The UK's biggest health information website. Has service information for England.

### NHS Direct Wales

**www.nhsdirect.wales.nhs.uk**
NHS health information site for Wales.

### NHS Inform

**Helpline** 0800 22 44 88
(Daily, 8am to 10pm)
**www.nhsinform.scot**
NHS health information site for Scotland.

### Patient UK

**www.patient.info**
Provides people in the UK with information about health and disease. Includes evidence-based information leaflets on a wide variety of medical and health topics. Also reviews and links to many health- and illness-related websites.

## Support with stopping smoking

### NHS Smoking Helpline

**Tel** 0300 123 1044 (Mon to Fri, 9am to 8pm, and Sat and Sun, 11am to 4pm)
**www.nhs.uk/smokefree/help-and-advice/support**
Offers free information, advice and support to people who are giving up smoking, and those who have given up and do not want to start again.

## Counselling and emotional support

### British Association for Counselling and Psychotherapy (BACP)

**Tel** 01455 883 300
**Email** bacp@bacp.co.uk
Promotes awareness of counselling and signposts people to appropriate services across the UK. You can search for a qualified counsellor at **itsgoodtotalk.org.uk**

### British Infertility Counselling Association

**www.bica.net**
Professional infertility counselling association. Can offer support and counselling to people affected by infertility.

### College of Sexual and Relationship Therapists

**www.cosrt.org.uk**
Provides practical suggestions and advice for people who need help with their personal relationships.

### Samaritans

**Helpline** 116 123
**Email** jo@samaritans.org
**www.samaritans.org**
Samaritans branches are located across England, Ireland, Scotland and Wales. Provides confidential and non-judgemental emotional support, 24 hours a day, 365 days a year, for people experiencing feelings of distress or despair.

## Financial or legal advice and information

### Benefit Enquiry Line Northern Ireland

**Tel** 0800 022 2450 (Mon, Tue, Wed and Fri, 9am to 5pm, and Thu, 10am to 5pm)
**Textphone** 028 9031 1092
**www.nidirect.gov.uk/money-tax-and-benefits**
Provides information and advice about disability benefits and carers' benefits in Northern Ireland. You can also call the Make the Call helpline on **0800 232 1271** to check you are getting all the benefits you are eligible for.

### Citizens Advice

Provides advice on a variety of issues including financial, legal, housing and employment issues. Use their online webchat or find details for your local office in the phone book or by contacting:

**England**
**Helpline** 03444 111 444
**www.citizensadvice.org.uk**

**Scotland**
**Helpline** 0808 800 9060
**www.citizensadvice.org.uk/scotland**

**Wales**
**Helpline** 03444 77 2020
**www.citizensadvice.org.uk/wales**

**Northern Ireland**
**Helpline** 0800 028 1181
**www.citizensadvice.co.uk**

### GOV.UK

**www.gov.uk**
Has information about social security benefits and public services in England, Scotland and Wales.

## Support for carers

### Carers Trust

**Tel 0300 772 9600**
(Mon to Fri, 9am to 5pm)
**Email** info@carers.org
**www.carers.org**
Provides support, information, advice and services for people caring at home for a family member or friend. You can find details for UK offices and search for local support on the website.

### Carers UK

**Helpline (England, Scotland, Wales)**
0808 808 7777
(Mon to Wed, 10am to 4pm)
**Helpline (Northern Ireland)**
028 9043 9843
**Email** advice@carersuk.org
**www.carersuk.org**
Offers information and support to carers across the UK. Has an online forum and can put people in contact with support groups for carers in their area.

## Support for young people

### CLIC Sargent

**Tel** 0300 330 0803
**www.clicsargent.org.uk**
Provides clinical, practical, financial and emotional support to children with cancer in the UK.

### Teenage Cancer Trust

**Tel** 0207 612 0370
(Mon to Fri, 9am to 5.30pm)
**Email**
hello@teenagecancertrust.org
**www.teenagecancertrust.org**
A UK-wide charity devoted to improving the lives of teenagers and young adults with cancer. Runs a support network for young people with cancer, their friends and families.

### Youth Access

**Tel** 020 8772 9900
(Mon to Fri, 9.30am to 1pm, then 2pm to 5.30pm)
**Email**
admin@youthaccess.org.uk
**www.youthaccess.org.uk**
A UK-wide organisation providing counselling and information for young people. Find your local service by visiting **youthaccess.org.uk/find-your-local-service**

# YOUR NOTES AND QUESTIONS

## Disclaimer

We make every effort to ensure that the information we provide is accurate and up to date but it should not be relied upon as a substitute for specialist professional advice tailored to your situation. So far as is permitted by law, Macmillan does not accept liability in relation to the use of any information contained in this publication, or third-party information or websites included or referred to in it. Some photos are of models.

## Thanks

This booklet has been written, revised and edited by Macmillan Cancer Support's Cancer Information Development team. It has been approved by our Senior Medical Editor, David Gilligan, Consultant Clinical Oncologist.

With thanks to: Linda Bedford, Macmillan Consultant Radiographer for Palliative Radiotherapy and Pre-treatment; Jon Bell, Consultant Interventional Radiologist; Alison Bennett, Macmillan Lung Cancer Nurse Specialist; Rachel Cooper, Consultant Clinical Oncologist; Heather Dias, Site Specialist Macmillan Radiographer; Sarah Gwynne, Consultant Clinical Oncologist; Catherine Heath, Consultant Clinical Oncologist; Sara Matthews, Macmillan Information and Support Radiographer; Heather Nisbet, Consultant Therapeutic Radiographer; Christine Taverner, Breast Clinical Nurse Specialist; Jonathan Waxman, Consultant Clinical Oncologist; Liz West, Senior Patient Support Radiographer; and Elaine Young, Consultant Clinical Oncologist.

Thanks also to the people affected by cancer who reviewed this edition, and to those who shared their stories.

We welcome feedback on our information. If you have any, please contact **cancerinformationteam@macmillan.org.uk**

## Sources

We have listed a sample of the sources used in the booklet below. If you would like more information about the sources we use, please contact us at **cancerinformationteam@macmillan.org.uk**

National Institute for Health and Care Excellence (NICE). www.nice.org.uk (accessed April 2018).
Royal College of Radiologists. Radiotherapy dose fractionation. 2nd Edition. 2016.
Society and College of Radiographers. Skin care advice for patients undergoing radical external beam megavoltage radiotherapy. February 2015. www.sor.org/learning/document-library/skin-care-advice-patients-undergoing-radical-external-beam-megavoltage-radiotherapy-0 (accessed April 2018).
Uptodate. Radiation therapy techniques in cancer treatment. 2017. www.uptodate.com/contents/radiation-therapy-techniques-in-cancer-treatment (accessed April 2018).

# Can you do something to help?

We hope this booklet has been useful to you. It's just one of our many publications that are available free to anyone affected by cancer. They're produced by our cancer information specialists who, along with our nurses, benefits advisers, campaigners and volunteers, are part of the Macmillan team. When people are facing the toughest fight of their lives, we're there to support them every step of the way.

We want to make sure no one has to go through cancer alone, so we need more people to help us. When the time is right for you, here are some ways in which you can become a part of our team.


**Share your cancer experience**
Support people living with cancer by telling your story, online, in the media or face to face.

**Campaign for change**
We need your help to make sure everyone gets the right support. Take an action, big or small, for better cancer care.

**Help someone in your community**
A lift to an appointment. Help with the shopping. Or just a cup of tea and a chat. Could you lend a hand?

**Raise money**
Whatever you like doing you can raise money to help. Take part in one of our events or create your own.

**Give money**
Big or small, every penny helps. To make a one-off donation see over.

## Call us to find out more

# 0300 1000 200

**macmillan.org.uk/getinvolved**

## Please fill in your personal details

Mr/Mrs/Miss/Other

Name

Surname

Address

Postcode

Phone

Email

Please accept my gift of £

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I enclose a cheque / postal order / Charity Voucher made payable to Macmillan Cancer Support

OR debit my:
Visa / MasterCard / CAF Charity Card / Switch / Maestro

Card number

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Expiry date

Issue no

Security number

Signature

Date / /

## Don't let the taxman keep your money

Do you pay tax? If so, your gift will be worth 25% more to us – at no extra cost to you. All you have to do is tick the box below, and the tax office will give 25p for every pound you give.

☐ I am a UK tax payer and I would like Macmillan Cancer Support to treat all donations I make or have made to Macmillan Cancer Support in the last 4 years as Gift Aid donations, until I notify you otherwise.

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**Macmillan Cancer Support and our trading companies would like to hold your details in order to contact you about our fundraising, campaigning and services for people affected by cancer. If you would prefer us not to use your details in this way please tick this box. ☐**

**In order to carry out our work we may need to pass your details to agents or partners who act on our behalf.**

Registered with FUNDRAISING REGULATOR

**If you'd rather donate online go to macmillan.org.uk/donate**

Please cut out this form and return it in an envelope (no stamp required) to: Supporter Donations, Macmillan Cancer Support, FREEPOST LON15851, 89 Albert Embankment, London SE1 7UQ

**This booklet is about radiotherapy. It is for anyone who is having radiotherapy or has been offered it as part of their cancer treatment. There is also information for carers, family members and friends.**

**The booklet explains what radiotherapy is, how it is given and possible side effects. It also has information about emotional, practical and financial issues.**

We're here to help everyone with cancer live life as fully as they can, providing physical, financial and emotional support. So whatever cancer throws your way, we're right there with you. For information, support or just someone to talk to, call **0808 808 00 00** or visit **macmillan.org.uk**

Would you prefer to speak to us in another language? Interpreters are available. Please tell us in English the language you would like to use. Are you deaf or hard of hearing? Call us using NGT (Text Relay) on **18001 0808 808 00 00**, or use the NGT Lite app.

Need information in different languages or formats? We produce information in audio, eBooks, easy read, Braille, large print and translations. To order these, visit **macmillan.org.uk/otherformats** or call our support line.

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