

Understanding Radiation Therapy

A guide for people with cancer, their families and friends



For information & support, call **13 11 20**

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Editor: Jenny Mothoneos. Designer: Eleonora Pelosi. Printer: IVE Group.

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Note to reader

Always consult your doctor about matters that affect your health. This booklet is intended as a general introduction to the topic and should not be seen as a substitute for medical, legal or financial advice. You should obtain independent advice relevant to your specific situation from appropriate professionals, and you may wish to discuss issues raised in this book with them.

All care is taken to ensure that the information in this booklet is accurate at the time of publication. Please note that information on cancer, including the diagnosis, treatment and prevention of cancer, is constantly being updated and revised by medical professionals and the research community. Cancer Council Australia and its members exclude all liability for any injury, loss or damage incurred by use of or reliance on the information provided in this booklet.

Cancer Council

Cancer Council is Australia's peak non-government cancer control organisation. Through the eight state and territory Cancer Councils, we provide a broad range of programs and services to help improve the quality of life of people living with cancer, their families and friends. Cancer Councils also invest heavily in research and prevention. To make a donation and help us beat cancer, visit cancer.org.au or call your local Cancer Council.



Cancer Council acknowledges Traditional Custodians of Country throughout Australia and recognises the continuing connection to lands, waters and communities. We pay our respects to Aboriginal and Torres Strait Islander cultures and to Elders past, present and emerging.



Cancer Council Australia Level 14, 477 Pitt Street, Sydney NSW 2000 ABN 91 130 793 725
Telephone 02 8256 4100 Email info@cancer.org.au Website cancer.org.au

About this booklet

This booklet has been prepared to help you understand more about radiation therapy, one of the main treatments for cancer. Radiation therapy is also known as radiotherapy.

We cannot give advice about the best treatment for you. You need to discuss this with your doctors. However, this information may answer some of your questions and help you think about what to ask your treatment team (see page 64). It may also be helpful to read the Cancer Council booklet about the type of cancer you have.

Some people feel concerned about the side effects of radiation therapy, but most side effects are temporary. We have included information about ways to manage the most common side effects.

This booklet does not need to be read from cover to cover – just read the parts that are useful to you. Some medical terms that are unfamiliar are explained in the glossary (see page 65). You may also like to pass this booklet to your family and friends for their information.

How this booklet was developed – This information was developed with help from a range of health professionals and people affected by cancer who have had radiation therapy.



If you or your family have any questions or concerns, call **Cancer Council 13 11 20**. We can send you more information and connect you with support services in your area. You can also visit your local Cancer Council website (see back cover).

Contents

What is cancer?	4
How cancer is treated	6
Key questions	8
What is radiation therapy?	8
Why have radiation therapy?	8
How does radiation therapy work?	9
How is radiation therapy given?	9
What is chemoradiation?	10
Which health professionals will I see?	10
Where will I have treatment?	12
How many treatments will I have?	12
How much does radiation therapy cost?	12
What are the steps in radiation therapy?	13
How do I prepare for radiation therapy?	14
Will I be able to work or exercise during radiation therapy?	16
Can I have radiation therapy if I'm pregnant?	17
How will I know the treatment has worked?	17
Making treatment decisions	18
External beam radiation therapy (EBRT)	20
How EBRT works	20
The treatment course	21
Planning EBRT treatment	22
What to expect at treatment sessions	24
Imaging scans you may have	26
Common types of EBRT	28
Specialised types of EBRT	31

Brachytherapy 33

How brachytherapy works	33
Planning brachytherapy	33
What to expect at treatment sessions	34
Types of brachytherapy	35
Other types of internal radiation therapy	38

Managing side effects 40

Preparing for side effects	40
How long side effects may last	41
Fatigue	43
Skin changes	44
Hair loss	45
Appetite loss and nausea	46
Mouth and throat problems	48
Bowel changes	50
Bladder changes	52
Lymphoedema	53
Sexuality, intimacy and fertility issues	54

Life after treatment 59

Follow-up appointments	60
Support from Cancer Council	61
Useful websites	62

Caring for someone with cancer 63

Question checklist 64

Glossary 65

How you can help 68

Key to icons

Icons are used throughout this booklet to indicate:



More information



Alert



Personal story



Tips

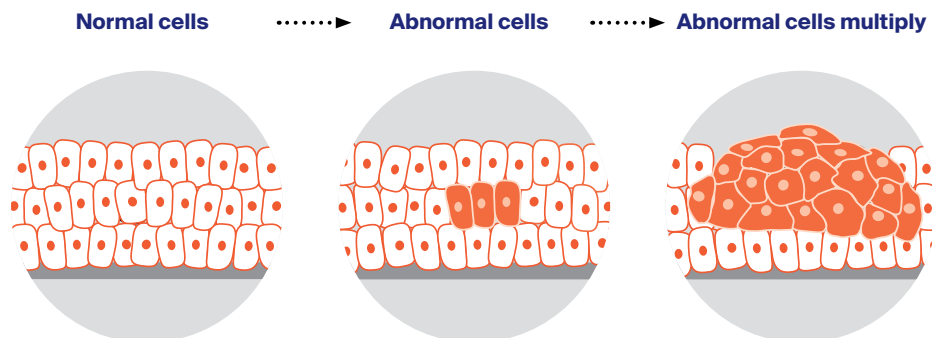
What is cancer?

Cancer is a disease of the cells. Cells are the body's basic building blocks - they make up tissues and organs. The body constantly makes new cells to help us grow, replace worn-out tissue and heal injuries.

Normally, cells multiply and die in an orderly way, so that each new cell replaces one lost. Sometimes, however, cells become abnormal and keep growing. These abnormal cells may turn into cancer.

In solid cancers, such as cervical or bowel cancer, the abnormal cells form a mass or lump called a tumour. In some cancers, such as leukaemia, the abnormal cells build up in the blood.

How cancer starts

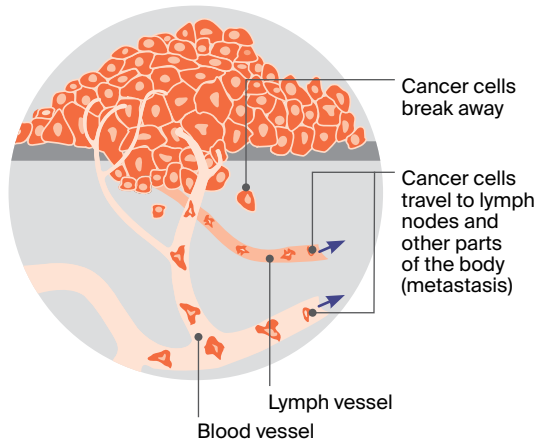
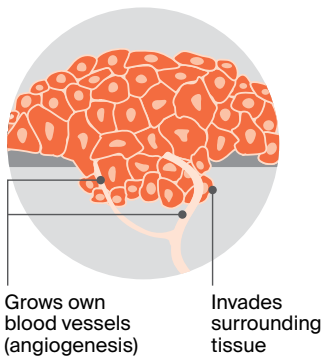


Not all tumours are cancer. Benign tumours tend to grow slowly and usually don't move into other parts of the body or turn into cancer. Cancerous tumours, also known as malignant tumours, have the potential to spread. They may invade nearby tissue, destroying normal cells. The cancer cells can break away and travel through the bloodstream or lymph vessels to other parts of the body.

The cancer that first develops is called the primary cancer. It is considered localised cancer if it has not spread to other parts of the body. If the primary cancer cells grow and form another tumour at a new site, it is called a secondary cancer or metastasis. A metastasis keeps the name of the original cancer. For example, bowel cancer that has spread to the liver is called metastatic bowel cancer, even though the main symptoms may be coming from the liver.

How cancer spreads

.....▶ Malignant cancer



How cancer is treated

Cancers are usually treated with surgery, radiation therapy (radiotherapy) or chemotherapy. Other drug treatments, such as hormone therapy, targeted therapy and immunotherapy, can also be used to treat some types of cancer.

These treatments may be used on their own, in combination (for example, you may have chemotherapy together with radiation therapy), or one after the other (for example, radiation therapy first then surgery).

Types of cancer treatments

surgery

An operation to remove cancer and/or repair a part of the body affected by cancer.

drug therapies

Drugs can travel throughout the body. This is called systemic treatment. Drug therapies include:

- **chemotherapy** – the use of drugs to kill cancer cells or slow their growth
- **hormone therapy** – drugs that block the effect of the body's natural hormones on some types of cancer
- **immunotherapy** – treatment that uses the body's own immune system to fight cancer
- **targeted therapy** – drugs that target specific features of cancer cells to stop the cancer growing or spreading.

radiation therapy

The use of a controlled dose of radiation to kill or damage cancer cells so they cannot grow, multiply or spread. Treatment aims to affect only the part of the body where the radiation is targeted.

Your treatment plan

Because cancer treatment is becoming more personalised, your treatment plan may be different from other people's, even if their cancer type is the same. The treatments recommended by your doctor depend on:

- the type of cancer you have
- where the cancer began (the primary site)
- whether the cancer has spread to other parts of your body (metastatic or secondary cancer)
- your general health, age and treatment preferences
- what treatments are currently available and whether there are any suitable clinical trials (see page 19).

Call Cancer Council 13 11 20 or look online for our free booklets and information about different cancer types and their treatments.

Radiation therapy for children

The information in this booklet is for adults having radiation therapy, although much of it will also be relevant for children. Ask your treatment team for age-appropriate support and resources for children. More information is available from:

Canteen – supports young people aged 12–25 affected by cancer. Call 1800 835 932 or visit canteen.org.au.

Camp Quality – offers services and programs for children aged up to 15

and their families. Call 1300 662 267 or visit campquality.org.au.

Cancer Australia Children's Cancer – information about how children's cancers are treated, and what to expect once treatment is finished. Visit childrenscancer.canceraustralia.gov.au.

Cancer Council – for a copy of the booklet *Talking to Kids About Cancer*, visit your local Cancer Council website or call 13 11 20.

Key questions

Q: What is radiation therapy?

A: Radiation therapy uses a controlled dose of radiation to kill cancer cells or damage them so they cannot grow, multiply or spread. Most forms of radiation therapy use focused, high-energy x-ray beams. Radiation can also be electron beams, proton beams, or gamma rays from radioactive sources. Radiation therapy is a localised treatment, which means it generally affects only the area being treated.

Q: Why have radiation therapy?

A: Radiation therapy is an important part of treating cancer. It's estimated that radiation therapy would be a suitable treatment for 50% of people with cancer.¹ It can be used in three main ways:

To achieve remission or cure – Radiation therapy may be given as the main treatment to cause the cancer to reduce (remission) or disappear (curative or definitive radiation therapy). Sometimes definitive radiation therapy is given together with chemotherapy to make it work better. This is called chemoradiation or chemoradiotherapy (see page 10).

To help other treatments – Radiation therapy is often used before other treatments (neoadjuvant) to shrink the tumour or after other treatments (adjuvant) to kill any remaining cancer cells.

To relieve symptoms – Radiation therapy can help to relieve pain and other symptoms by making the cancer smaller or stopping it from spreading. This is known as palliative treatment.

Q: How does radiation therapy work?

A: Radiation therapy aims to kill or damage cancer cells in the area being treated. Cancer cells begin to die days or weeks after treatment starts, and continue to die for weeks or months after it finishes. Treatment is carefully planned to do as little harm as possible to healthy cells near the cancer. Most of these cells tend to receive a lower dose and can usually repair themselves.

Many people will develop temporary side effects during or shortly after treatment that may cause pain or discomfort. Read about ways to prevent or manage side effects on pages 40–58.

Q: How is radiation therapy given?

A: There are two main ways of giving radiation therapy – from outside the body or inside the body. You may have one or both types of radiation therapy, depending on the cancer type and other factors.

External beam radiation therapy (EBRT) – Radiation beams from a large machine called a linear accelerator are precisely aimed at the area of the body where the cancer is located. The process is similar to having an x-ray. You will lie on a treatment table underneath a machine that moves around your body. You won't see or feel the radiation, although the machine can make noise as it moves. For more information, see pages 20–32.

Internal radiation therapy – A radiation source is placed inside the body or, more rarely, injected into a vein or swallowed. The most common form of internal radiation therapy is brachytherapy, where temporary or permanent radiation sources are placed inside the body next to or inside the cancer. For more information, see pages 33–39.

What is chemoradiation?

Chemoradiation means having radiation therapy at the same time as chemotherapy. The chemotherapy drugs make the cancer cells more sensitive to radiation therapy. Having radiation therapy and chemotherapy together increases the success of the treatment compared with having either treatment on its own.

Chemoradiation is only used to treat some cancers such as anal, brain, bowel, head and neck, lung, cervical, uterine, oesophageal, pancreatic and vaginal cancer.

If you have chemoradiation, you will usually receive chemotherapy a few hours before some radiation therapy appointments. Your doctor will talk to you about your treatment plan.

The side effects of chemoradiation depend on the type of chemotherapy you have. They also depend on the radiation therapy treatment area.

Your radiation therapy team can provide support and information about how to manage any side effects you develop.

Q: Which health professionals will I see?

A: During and after treatment, you will see a range of health professionals who specialise in different aspects of your cancer care (see table opposite).

The main specialist doctor for radiation therapy is a radiation oncologist. You may be referred to a radiation oncologist by your general practitioner (GP) or by another specialist such as a surgeon or medical oncologist.

Treatment options will often be discussed with other health professionals at what is known as a multidisciplinary team (MDT) meeting. You may also see some allied health professionals to help you manage any treatment side effects.

Health professionals you may see

radiation oncologist*	treats cancer by prescribing and overseeing a course of radiation therapy
radiation therapist	plans and delivers radiation therapy
radiation oncology nurse	provides care, information and support for managing side effects and other issues throughout radiation therapy
medical physicist	ensures treatment machines are working accurately and safely; oversees safe delivery of radionuclide therapy; monitors radiation levels
medical oncologist*	treats cancer with drug therapies such as chemotherapy, targeted therapy and immunotherapy (systemic treatment)
surgeon*	surgically removes tumours and performs some biopsies
dietitian	helps with nutrition concerns and recommends changes to diet during treatment and recovery
speech pathologist	helps with communication and swallowing difficulties during treatment and recovery
social worker	links you to support services and helps you with emotional, practical and financial issues
psychologist/ counsellor	help you manage your emotional response to diagnosis and treatment
occupational therapist	assists in adapting your living and working environment to help you resume usual activities after treatment
physiotherapist, exercise physiologist	help restore movement and mobility, and improve fitness and wellbeing
lymphoedema practitioner	educates people about lymphoedema prevention and management, and provides treatment if lymphoedema occurs

* *Specialist doctor*

Q: Where will I have treatment?

A: Radiation therapy is usually given in the radiation oncology department of a hospital or in a treatment centre. This may be in the public or private health system.

Most people have radiation therapy as an outpatient. This means you do not stay in hospital, but travel to the hospital or treatment centre for each session. It's a good idea to think about how you will get to the radiation therapy sessions (see page 15). For some types of internal radiation therapy, you may need to stay in hospital overnight or for a few days.

Q: How many treatments will I have?

A: If you are having radiation therapy with the aim of making the cancer go away, you may have treatment for 5-7 weeks. Usually treatment is once a day, Monday to Friday, but sometimes it's given twice a day. Your doctor will tell you how many treatments you will have. If you live a long way from the treatment centre and you're having a short course, your treatment may be given two or three times per week.

Q: How much does radiation therapy cost?

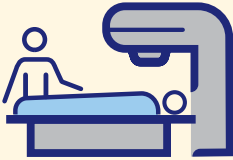
A: If you receive radiation therapy as an outpatient in a public hospital, Medicare pays for your treatment. Medicare also covers some of the cost of radiation therapy in private clinics, but you may have to pay the difference between the cost of treatment and the Medicare rebate (gap payment). Private health insurance does not usually cover radiation therapy, as it's considered an outpatient treatment. Before treatment starts, ask your provider for a written quote that shows what you will have to pay.

What are the steps in radiation therapy?



1. Consultation session

You will meet with a radiation oncologist. They will check your test results, assess your fitness for treatment, and explain the process and expected results, and discuss possible side effects and risks. You will be asked to agree (consent) to have treatment.



2. Planning session

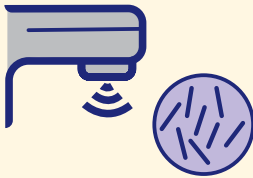
You will meet with a radiation therapist. They will work out how to best position your body during EBRT or where to place the applicators for brachytherapy.

- Planning for EBRT, see pages 22–23.
- Planning for brachytherapy, see pages 33–34.



3. Treatment plan

Based on the planning session and the treatment guidelines for the cancer type, the radiation oncologist, radiation therapist and medical physicist will work out the radiation dose, what area needs to be treated and how to deliver the right dose of radiation.



4. Treatment sessions

Radiation therapists will deliver the course of radiation therapy as set out in the treatment plan. How long each treatment session takes will depend on the type of radiation therapy.

- Treatment for EBRT, see pages 24–25.
- Treatment for brachytherapy, see pages 34–37.



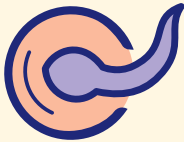
5. Review and follow-up

You will have regular reviews during treatment to monitor and discuss how to manage any side effects. After radiation therapy ends, you will see the radiation oncologist to find out whether the cancer has responded to treatment.

How do I prepare for radiation therapy?

The side effects of radiation therapy depend on the part of the body being treated, the radiation dose and the number of treatments you need. Your

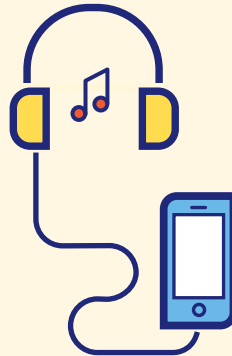
Ask about fertility



Some types of radiation therapy affect fertility. If you think you may want to have children in the future, talk to your treatment team about your options before radiation therapy begins.

► See pages 55–57 and our *Fertility and Cancer* booklet.

Explore ways to relax



Read a book or listen to music while you wait, ask a friend or family member to keep you company, or try chatting to other people waiting for treatment. To help you relax during the session, try breathing exercises or meditation, or ask the radiation therapists if you can listen to music.

Organise help at home



Support with housework and cooking can ease the load. If you have young children, arrange for someone to look after them during radiation therapy sessions. Older children may need someone to drive them to and from school and activities. Ask a friend or family member to coordinate offers of help, or use an online tool such as candoapp.com.au or gathermycrew.org.au.

Consider quitting



If you smoke, it is important to stop smoking before starting treatment. Smoking may mean the treatment doesn't work as well and it can make side effects worse. If you need support to quit smoking, talk to your doctor or call the Quitline on 13 7848.

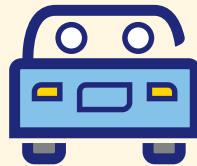
treatment team will tell you about the likely effects for you. It can be hard to know how to prepare, but several issues are worth thinking about in advance.

Discuss your concerns



Keep a list of questions and add to it whenever you think of a new question. If you are feeling anxious about having radiation therapy, talk to the treatment team, your GP, a family member or friend, or call Cancer Council 13 11 20.

Arrange transport and accommodation



Plan how you will get to radiation therapy sessions. If travelling by car, ask about parking. You are likely to feel more tired as the treatment goes on, so arrange for someone to drive you. If you have to travel a long way for radiation therapy, you may be eligible for financial assistance to help cover the cost of travel or accommodation. Your local Cancer Council may also provide accommodation services. Call Cancer Council 13 11 20 to find out if there is a transport to treatment service or accommodation service in your area and how to access patient travel assistance.

Check your teeth



If you are having radiation therapy for a cancer in the head and neck region, visit your dentist for a check-up before radiation therapy begins. The dentist can check for any teeth that may cause an infection and advise if they need to be removed before you start treatment.

Mention medical implants

Let your treatment team know if you have any medical devices in your body. This may be a pacemaker, cochlear implant or metal implant, such as a hip or knee replacement. Radiation therapy can affect these devices or be affected by them.

Q: Will I be able to work or exercise during radiation therapy?

A: You may feel well enough to continue working and doing your usual activities when you first start radiation therapy. As you have more sessions, you may feel more tired or lack energy. Whether you will be able to work depends on the type of radiation therapy you have, how the treatment makes you feel and the type of work you do. Ask your treatment team if they offer very early or late appointments so that you can fit your treatment appointments around your work.

Let your employer know about how much time you are likely to need off work. Explain that it is hard to predict how radiation therapy will affect you, and discuss the options of flexible hours, modified duties or taking leave.

Your treatment team will encourage you to be as active as possible as this can help you feel better. Research shows that exercise can help manage ongoing effects of radiation therapy, including fatigue.

- ▶ See our *Cancer, Work & You* and *Exercise for People Living with Cancer* booklets.

“The radiation therapy department was able to schedule sessions for first thing in the morning to fit in with my work schedule. The sessions were really quick and I was able to drive straight to work afterwards. As a working mum, being able to continue going to work was so beneficial. Not only was it important to keep my mind busy, but having the support of my colleagues was invaluable.” ANNIE

Q: Can I have radiation therapy if I'm pregnant?

A: You probably won't be able to have radiation therapy if you are pregnant, as radiation can harm a developing baby. It's also important that you don't become pregnant during the course of treatment. If at any time you suspect you may be pregnant, it is important to tell your doctor. If you are breastfeeding, ask your doctor whether it is safe to keep breastfeeding while you're having radiation therapy.

It is recommended that people who have radiation therapy to the pelvic area avoid getting their partner pregnant during treatment and for about six months afterwards, as radiation therapy can damage sperm. Your doctor will be able to give you more information about radiation therapy and pregnancy (see also page 54).

Q: How will I know the treatment has worked?

A: Because cancer cells continue to die for weeks or months after treatment ends, your radiation oncologist most likely won't be able to tell you straightaway how the cancer is responding. After treatment finishes, you will have regular check-ups. Your radiation oncologist will do a physical examination and arrange tests or scans to check how the cancer has responded to treatment. You may not know the full benefit of having radiation therapy for some months.

If radiation therapy is given as palliative treatment, the relief of symptoms is a good sign that the treatment has worked. This may take a few days or weeks. Until then, you may need other treatments for your symptoms, for example pain medicine.



Making treatment decisions

Sometimes it is difficult to decide on the type of treatment to have. You may feel that everything is happening too fast, or you might be anxious to get started.

Check with your radiation oncologist how soon treatment should begin, as it may not affect the success of the treatment to wait a while. Ask them to explain the options, and take as much time as you can before making a decision.

Know your options – Understanding the disease, the available treatments, possible side effects and any extra costs can help you weigh up the options and make a well-informed decision. Check if the specialist is part of a multidisciplinary team (see page 10) and if the treatment centre is the most appropriate one for you – you may be able to have treatment closer to home, or it might be worth travelling to a centre that specialises in a particular treatment.

Record the details – When your doctor first says you have cancer, you may not remember everything you are told. Taking notes can help. If you would like to record the discussion, ask your doctor first. It is a good idea to have a family member or friend go with you to appointments to join in the discussion, write notes or simply listen.

Ask questions – If you are confused or want to check anything, it is important to ask your specialist questions. Try to prepare a list before appointments (see page 64 for suggestions). If you have a lot of questions, you could talk to a cancer care coordinator or nurse.

Consider a second opinion – You may want to get a second opinion from another specialist to confirm or clarify your specialist's recommendations or reassure you that you have explored all of your options. Specialists are used to people doing this. Your GP or specialist can refer you to another specialist and send your initial results to that person. If you want to get a second opinion, it is best to do it before starting radiation therapy, so you don't have to repeat the planning session. You might decide you would prefer to be treated by the second specialist or that you still want to be treated by your first doctor.

It's your decision – Adults have the right to accept or refuse any treatment that they are offered. For example, some people with advanced cancer choose treatment that has significant side effects even if it gives only a small benefit for a short period of time. Others decide to focus their treatment on quality of life. You may want to discuss your decision with the treatment team, GP, family and friends.

► See our *Cancer Care and Your Rights* booklet.

Should I join a clinical trial?

Your doctor or nurse may suggest you take part in a clinical trial. Doctors run clinical trials to test new or modified treatments and ways of diagnosing disease to see if they are better than current methods. For example, if you join a randomised trial for a new treatment, you will be chosen at random to receive either the best existing treatment or the modified new treatment. Over the years, trials have improved treatments and

led to better outcomes for people diagnosed with cancer.

You may find it helpful to talk to your specialist, clinical trials nurse or GP, or to get a second opinion. If you decide to take part in a clinical trial, you can withdraw at any time. For more information, visit australiancancertrials.gov.au.

► See our *Understanding Clinical Trials and Research* booklet.

External beam radiation therapy

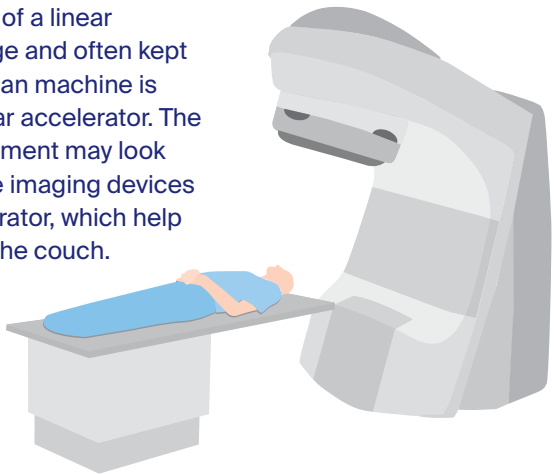
External beam radiation therapy (EBRT) is the most common type of radiation therapy. It directs high-energy radiation beams at the cancer.

How EBRT works

EBRT is delivered using a radiation machine. The most common type is a linear accelerator (see below). You will lie on a treatment table or “couch” under the machine. The machine does not touch you, but it may rotate around you to deliver radiation to the area with cancer from different directions. This allows the radiation to be more precisely targeted at the cancer and limits the radiation given to surrounding normal tissues.

Linear accelerator

This is a general illustration of a linear accelerator (LINAC). It's large and often kept in a separate room. A CT scan machine is usually attached to the linear accelerator. The machine used for your treatment may look different. There may also be imaging devices on or near the linear accelerator, which help position you accurately on the couch.



The treatment course

After the planning session, your radiation oncologist will work out the total dose of radiation needed to treat the cancer and the total number of treatments.

Fractions – In most cases, the total dose will be divided into a number of smaller doses called fractions, which are given on different days. The length of each session will depend on the type of EBRT (see pages 28–29).

Course – A course of treatment refers to the total number of sessions of radiation therapy. How often and how long you need to have radiation therapy depends on the type of cancer, the total dose required, the location of the cancer and the aim of treatment.

In general, higher total doses of radiation are used for curative treatment. A fraction of the dose will be given once a day, Monday to Friday, for 3–8 weeks. Dividing the total dose into separate treatment sessions with weekend rest breaks allows the healthy cells time to recover. Occasionally, the radiation oncologist may recommend two treatments a day, with usually six hours between the sessions.

A course of radiation therapy used to relieve symptoms (palliative treatment) is usually shorter. You may have 1–15 sessions. Palliative radiation therapy may not be given every day.



Each fraction of radiation causes a little more damage to cancer cells, so it's important to go to all of your scheduled sessions if your treatment is curative. When you miss sessions, cancer cells have more time to repair the damage, so your radiation therapy may not work as well. If a treatment break is necessary, you may have extra sessions to make up for the missed sessions.

Planning EBRT treatment

EBRT needs to be carefully planned to ensure that enough radiation reaches the cancer, while as little radiation as possible reaches healthy tissues and organs. The planning steps below may take place over a few appointments.



Consultation session

- This may take up to two hours.
- To assess whether radiation therapy is the right treatment for you, the radiation oncologist will talk to you, do a physical examination, and look at all your test results and scans.
- The radiation oncologist will explain how radiation therapy will help you, what will happen during planning and treatment, and what side effects to expect.
- You will also meet the radiation oncology nurse and a radiation therapist. They can provide support and further information. They will usually explain what side effects to expect and how to manage them.
- The radiation oncologist may arrange further x-rays, scans or other tests to find out more about the cancer.
- Consider taking someone with you to keep you company, ask questions and make notes.



CT planning session

- You'll have a planning CT scan even if you had a CT scan to diagnose the cancer. It shows where you need to receive radiation. The CT planning or simulation scan is usually done soon after the consultation session.
- You will have the CT planning scan in the same position you will be placed in for treatment.
- You might have an injection of dye to help show up certain parts of your body.
- You may need to hold your breath during the scan. You may also have a special CT scan, called a 4DCT, to track your breathing or be taught how to take deep breath holds. This may improve treatment accuracy and helps protect the heart.
- The images are sent to a computer. This allows the radiation oncologist to work out where to direct the radiation. The oncologist will prescribe the dose of radiation to help the radiation therapists and medical physicist plan treatment.

Visit targetingcancer.com.au/radiation-therapy/ebrt to watch a video explaining how radiation therapy works. You may find that things are done slightly differently where you have treatment.



Helping you keep still

- You will usually need some type of device to help you stay in exactly the same position for each session and to keep you still during treatment.
- This is known as an immobilisation device. It will be made during the CT planning session. Depending on the area being treated, the device could be a breast board, a knee or foot cushion, or a bag that moulds to the shape of your body.
- For radiation therapy to the head or neck area, you may need to wear a plastic immobilisation mask. This will be made to fit you. A mask can feel strange and confining, but you will still be able to hear, speak and breathe.
- Depending on the area being treated, a device known as a spacer may be inserted to move normal tissue away from the area receiving radiation. Examples of spacers include gels and balloons.



Skin markings

- To make sure you are in the same position each session, a few very small permanent ink spots (tattoos) may be marked on your skin. These tattoos are the size of a small freckle and can't be easily seen.
- Sometimes temporary ink marks are made on the skin. Ask the radiation therapist if you can wash these marks off or if need to keep them until the end of the treatment. The ink may be redrawn during the course of treatment, but it will gradually fade.
- If you have to wear a mask or cast, the markings may be made on this device rather than on your skin.
- To help with image guidance (see pages 26–27), you may have a small surgical procedure to insert markers (usually made of gold) into or near the cancer. These internal markers can then be seen on scans during the treatment.

What to expect at treatment sessions

You will usually start radiation therapy a few days or weeks after the planning session. There will be at least two radiation therapists at each treatment session. You may be asked to change into a hospital gown and remove any jewellery before you are taken into the treatment room. The treatment room will be in semi-darkness so the therapists can see the light beams from the treatment machine and line them up with the tattoos or marks on your body or mask.

Positioning you for treatment – If you are having image-guided radiation therapy (see page 28), the radiation therapists will take x-rays or a CT scan to make sure you are in the same position as you were during the planning session. This may mean moving the table or your body. They will check the scans straightaway and make any adjustments needed.

Receiving the treatment – Once you are in the correct position, the radiation therapists will leave the treatment room. They can see you on a television screen and you can talk to them over an intercom. The radiation therapists will control the machine from a nearby room. The machine may move around you into different positions but it will not touch you. You won't see or feel the radiation but you may hear a buzzing noise from the machine while it is working and when it moves. The radiation therapist may turn off the machine and come into the room to change your position or adjust the machine.

It is important to stay very still to ensure the treatment targets the correct area. The radiation therapists will tell you when you can move. You will usually be able to breathe normally during the treatment. For treatment to some areas, such as the chest, you may be asked to take a deep breath and hold it while the radiation is delivered.

The treatment itself takes only a few minutes, but each session of EBRT may last around 10–40 minutes because of the time it takes the radiation therapists to set up the equipment, place you into the correct position and then do the CT scan. The first session may take longer while checks are performed. You will be able to go home once the session is over.

Managing discomfort during treatment – EBRT itself is painless and you won't feel it happening. If you feel some discomfort when you're lying on the treatment table, tell the therapists – they can switch off the machine and start it again when you're ready. If you're in pain because of the position you're in or because of pain from the cancer, talk to the radiation oncology nurse. They may suggest you take pain medicine before each session.

Some people who have treatment to the head say they see flashing lights or smell unusual odours. These effects are not harmful, but tell the radiation therapists if you have them.

Taking safety precautions – EBRT does not make you radioactive because the radiation does not stay in your body after each treatment session. You will not need to take any special precautions with bodily fluids (as you would with chemotherapy). It is safe for you to be with other people including children and pregnant women, and for them to come to the radiation therapy centre with you. However, they cannot be in the room during the treatment.

After the treatment session – You will see the radiation oncologist, a registrar (a hospital doctor training to be a radiation oncologist) or a radiation oncology nurse regularly to check your progress and discuss any side effects.

Managing anxiety before and during EBRT

The radiation therapy machines are large and kept in an isolated room. This may be confronting, especially at your first treatment session. You may feel more comfortable as you get to know the staff, procedures and other patients.

If you are having radiation therapy for a head and neck or brain cancer, you may have to wear a mask during each session. Wearing the mask may make you feel anxious or claustrophobic.

Tell the radiation therapists if you feel anxious or claustrophobic before or during treatment.

With the support of the radiation therapy team, many people find that they get used to wearing the mask. The team may suggest you try breathing or relaxation exercises, or listening to music to help you relax. A mild sedative may also help.

► Listen to our *Finding Calm During Cancer* podcast.

Imaging scans you may have

During planning and treatment, you may need to have some of the following tests to show the exact position and shape of the cancer. Your treatment team will explain what to expect from each test, or you can call Cancer Council 13 11 20 for more information.

X-ray – Intense but low-energy radiation passes through the body and creates an image on x-ray film, with darker areas representing soft tissues, and lighter areas showing denser tissues, such as bones.

CT scan – A CT (computerised tomography) scan uses x-ray beams to create detailed pictures of the inside of the body. Before the scan, you may have an injection of dye into one of your veins to make the pictures clearer. You will lie on a table that moves slowly through the CT scanner.

If you are having radiation therapy for prostate, uterine or cervical cancer, the volume of your bladder will be checked during the scan. This is because the size and shape of the bladder affects the position of the prostate, uterus and cervix. You'll be asked to drink a set amount of water before treatment to make sure the bladder is full and the prostate, uterus or cervix is in the same position each time.

MRI scan – An MRI (magnetic resonance imaging) scan uses a powerful magnet and radio waves to create detailed cross-sectional pictures of the inside of the body. A dye may be injected into a vein before the scan to make the pictures clearer. You will lie on a table that slides into a large metal tube. The machine can be noisy.

PET scan – Before a PET (positron emission tomography) scan, you will be injected with a solution containing a small amount of radioactive material. Cancer cells absorb more of the solution and show up brighter on the scan.

PET-CT scan – This combines a PET scan and a CT scan in one machine. The machine looks similar to a CT scanner.

Ultrasound – An ultrasound uses soundwaves to create pictures of your internal organs. A small device called a transducer is passed over an area of the body. The transducer sends out soundwaves that echo when they meet something dense, like an organ or tumour.



Before having scans, tell the doctor if you have any allergies or have had a reaction to dyes during previous scans. You should also let them know if you have diabetes or kidney disease or are pregnant or breastfeeding.

Common types of EBRT

EBRT can be given using different techniques and types of radiation. The radiation oncologist will recommend the most suitable method for you. If you need a type of

Type	What it is	When used
three-dimensional conformal radiation therapy (3DCRT)	most common type of EBRT	used to treat many different types of cancer
intensity-modulated radiation therapy (IMRT)	highly accurate type of conformal radiation therapy	used for most types of cancer, especially for curative treatment
volumetric modulated arc radiation therapy (VMAT) or Rapid Arc	type of IMRT	used for many types of cancer, especially if near sensitive body organs
image-guided radiation therapy (IGRT)	uses x-rays or CT scans at the start of each session to check that you are in the correct position for treatment	may be recommended for cancer in areas that are likely to move a lot, such as the lungs from breathing
stereotactic radiosurgery (SRS) and stereotactic radiation therapy (SRT)	specialised type of radiation therapy; SRS is not surgery and does not involve any surgical cuts	used for brain tumours
stereotactic body radiation therapy (SBRT) or stereotactic ablative body radiation therapy (SABR)	delivers tightly focused beams of high-dose radiation precisely onto the tumour from many different angles	may be used to treat small cancers in the body, including small lung or liver cancers or small metastases (cancer that has spread away from the primary cancer)

radiation therapy that is not available at your local hospital, they may arrange for you to have it at another centre.

How it works	Machine type	How often
the radiation beam is shaped (conformed) to fit the treatment area; this means that the tumour receives most of the radiation, and healthy tissues receive much less	LINAC	usually once a day, Monday to Friday
shapes and divides multiple beams of radiation into tiny beams (beamlets) to closely fit the tumour while healthy tissue nearby receives lower doses of radiation therapy	LINAC	once a day, Monday to Friday
machine moves around you and reshapes and changes the intensity of the radiation beam to the tumour	LINAC	once a day, Monday to Friday
repeated imaging allows for your position or radiation dose to be adjusted during treatment; this helps protect normal tissue	LINAC or MR-LINAC (combines MRI with LINAC)	once a day, Monday to Friday
many small beams of radiation are aimed at the tumour from different directions to target the exact shape of the tumour	LINAC but may use a CyberKnife or Gamma Knife machine	can vary, usually given in one dose
combines many small beams of radiation from different angles to target the exact shape of the tumour	LINAC or Gamma Knife machine	up to five doses, given once a day



Jackie's story

I was diagnosed with early-stage breast cancer after a routine mammogram. I had surgery and my doctor recommended I have radiation therapy as well.

At my first appointment with the radiation oncologist, she explained what radiation therapy is and described what would happen during each session.

She told me the radiation therapist would give me small tattoos to make sure the treatment reached the same area each time. I don't like tattoos, and it really caught me by surprise that I had to get them. As it turns out, they're very small and I didn't feel any pain having them.

At the planning appointment, the radiation therapists placed me in the position I would be in at each session. They told me I had to keep very still to make sure the treatment was effective. I saw the room where I would be having treatment, which was really helpful as it meant I knew what to expect at my first session.

I had treatment Monday to Friday for six weeks. Some days I had treatment very quickly, and on other days I had to wait a bit longer. I passed the time by reading a book or doing puzzles.

The actual treatment took only a few minutes each visit. I didn't find it hard to keep still, as the therapists positioned me very well and I was kept in place with a mould shaped like a wedge.

Towards the end of the six weeks, I started to feel very tired and I would sleep a lot.

The nurses gave me cream and gel to put on the skin of the treatment area. I used these every day as soon as treatment started and for a short time after it finished. I developed dark marks that looked like burns, but most of them have faded.

Specialised types of EBRT

Total body irradiation (TBI)

This is a form of radiation therapy that's given to the whole body for blood cancers. Sometimes TBI is given with chemotherapy to prepare people for a stem cell or bone marrow transplant.

You will be admitted to hospital before you have TBI. A course of TBI is usually given in very low doses, twice a day over 2–4 days, with the treatments being at least six hours apart. Side effects may include nausea, diarrhoea, fatigue and skin redness.

Proton therapy

This type of EBRT, uses radiation from protons rather than x-rays. Protons are tiny parts of atoms with a positive charge that release most of their radiation within the cancer. This is different to standard radiation therapy beams, which pass through the area and some nearby healthy tissue.

Special machines called cyclotrons and synchrotrons are used to generate and deliver the protons. Proton therapy is useful when the cancer is near sensitive areas, such as the brain stem or spinal cord, especially in children. Using proton therapy may help to reduce side effects.

Proton therapy is not yet available in Australia (as at December 2021), but there is funding in special cases to allow Australians to travel overseas for treatment.

Key points about external beam radiation therapy (EBRT)

What EBRT is

EBRT directs radiation beams to the cancer from a special machine, usually a linear accelerator.

How EBRT is given

- You will lie on a table called a treatment couch. The radiation therapists will control the machine from the next room. They will be able to see you and talk with you through a speaker, and they can pause the treatment if necessary.
 - Most people will need a special device, such as a board, body mould or mask, to keep them still and in the same position during treatment sessions. Your radiation therapists will put small marks (dots of ink or tattoos) on your skin to help them position you correctly each time.
 - Most sessions last for 10–40 minutes. The radiation therapy itself takes only a few minutes. Most of the time is spent setting up the equipment, placing you in the correct position and doing scans. The treatment is painless.
 - The length of the treatment course will vary depending on the type of cancer, the prescribed dose and the aim of treatment.
 - Most curative treatments occur Monday to Friday for 3–8 weeks. For palliative treatments, you may have a short course of between one and 15 sessions.
-

Safety of EBRT

- EBRT can't be seen or felt.
 - The radiation does not make you radioactive.
 - It is safe to be around other people, including children and pregnant women, afterwards.
-

Brachytherapy

Brachytherapy is the most common type of internal radiation therapy. It is used to treat some types of cancer, including breast, cervical, prostate, uterine and vaginal. As with external beam radiation therapy (EBRT), the main treating specialist for brachytherapy is a radiation oncologist (see page 11). How you have brachytherapy may vary between hospitals. The general process is described in this chapter, but your treatment team can give you more specific information.

How brachytherapy works

In brachytherapy, sealed radioactive sources are placed inside the body, close to or inside the cancer. The sources produce gamma rays, which have the same effect on cancer as the x-rays used in EBRT, but act over a short distance only. It is a way of giving a high dose of radiation to the cancer with only a very low dose reaching surrounding tissues and organs.

The type of brachytherapy used depends on the type of cancer. It may include seeds, needles, wires, pellets or small mobile sources that move from a machine into the body through applicators (thin plastic tubes). Brachytherapy may be used alone or with EBRT (see pages 20–32).

Planning brachytherapy

The radiation oncologist will explain what treatment will involve and tell you whether you can have treatment during a day visit (outpatient) or will need a short stay in hospital (inpatient). You will have tests and scans to help your team decide where to place the radioactive sources

and work out the correct dose to deliver to the cancer. These tests may include an ultrasound, CT scan and/or MRI scan (see pages 26–27). The radiation oncologist will explain possible side effects and discuss any safety precautions. For some cancers, imaging tests, planning and treatment may all occur in the same session.

What to expect at treatment sessions

Depending on the type of brachytherapy you are having, you may need to have a local anaesthetic to numb the area being treated, or a general anaesthetic so you will be unconscious for the treatment. The radiation sources will be positioned in your body, sometimes with the help of imaging scans (such as x-ray, ultrasound and CT) and computerised machines.

You should not have any severe pain or feel ill during a course of brachytherapy. If the radioactive sources are being held in place by an applicator, you may feel some discomfort, but your doctor can prescribe medicine to help you relax and relieve any pain. Once the applicator is removed, you may be sore or sensitive in the treatment area.

After the treatment, you may have to limit physical and sexual activity and take some safety precautions (see page 36) for a period of time – your treatment team will advise you.



If you need to stay in hospital for treatment, take reading material and other activities to pass the time). You may also be able to watch television or listen to music. Check with your doctor what you can take into the room, as there may be restrictions.

Dose rates

You may be told you are having high-dose-rate or low-dose-rate brachytherapy. Pulsed-dose-rate brachytherapy is not used often.

high-dose-rate (HDR)	Uses a single source that releases high doses of radiation in short sessions, each lasting a number of minutes. The source is removed at the end of each session.
low-dose-rate (LDR)	Uses multiple sources or seeds that release radiation over days, weeks or months. The sources may be temporary or permanent.
pulsed-dose-rate (PDR)	Uses a single source that releases radiation for a few minutes every hour over a number of days. The source is removed at the end of treatment.

Types of brachytherapy

Depending on the type of cancer and your radiation oncologist's recommendation, the radioactive sources may be placed in your body for a limited time or permanently.

Temporary brachytherapy

In temporary brachytherapy, you may have one or more treatment sessions to deliver the full dose of radiation prescribed by the radiation oncologist. The radioactive source is inserted using applicators such as thin plastic tubes (catheters) or cylinders. The source is removed at the end of each treatment session. The applicator may be removed at the same time or left in place until after the final session.

Temporary brachytherapy is mostly used for prostate cancers and gynaecological cancers (such as cervical and vaginal cancers).

Safety precautions for temporary brachytherapy

While the radioactive source is in place, some radiation may pass outside your body. For this reason, hospitals take certain safety precautions to avoid exposing staff and visitors to radiation. Staff will explain any restrictions before you start brachytherapy treatment.

If you have temporary brachytherapy, once the source is removed, you are not radioactive and there is no risk to other people. You won't have to take any further precautions.

High-dose-rate brachytherapy – This will be given for a few minutes at a time during multiple sessions. The radiation therapists will leave the room briefly during the treatment, but will be able to see and talk to you from another room. You may be able to have this treatment as an outpatient.

Low-dose-rate or pulsed-dose-rate brachytherapy – The radioactive sources will deliver radiation over 1–6 days. For these types of brachytherapy, you will stay in hospital for a few days and will be in a dedicated treatment room on your own. This room is close to the main hospital ward – you can use an intercom to talk with staff and visitors outside the room. If you have concerns about being alone, talk to the treatment team.

For low-dose-rate or pulsed-dose-rate brachytherapy, precautions may include:

- hospital staff only coming into the room for short periods of time
- limiting visitors during treatment
- visitors sitting away from you
- avoiding contact with children under 16 and pregnant women.

Permanent brachytherapy

In permanent low-dose-rate brachytherapy, radioactive seeds about the size of a grain of rice are put inside special needles and implanted into the body while you are under general anaesthetic. The needles are removed, and the seeds are left in place to gradually decay.

As the seeds decay, they slowly release small amounts of radiation over weeks or months. They will eventually stop releasing radiation, but they will not be removed. Low-dose-rate brachytherapy is often used to treat early-stage prostate cancers.

Safety precautions for permanent brachytherapy

If you have permanent brachytherapy, you will be radioactive for a short time after the seeds are inserted. The radiation is usually not strong enough to be harmful to people around you, so it is safe to go home. However, you may need to avoid close contact with young children and pregnant women for a short time – your treatment team will advise you of any precautions to take. You will normally be able to return to your usual activities a day or two after the seeds are inserted.

“For the first few weeks after the seeds were implanted, I thought this is a doddle. Then suddenly, I started getting this really urgent need to urinate. That gave me a few weeks of disturbed sleep, but the urgency gradually eased off and I thought this is pretty good. Now after three years, there’s no sign of the cancer and I’ve had no long-term side effects.” DEREK

Other types of internal radiation therapy

For some cancers, you may be referred to a nuclear medicine specialist to have another type of internal radiation therapy.

Radionuclide therapy – Also known as radioisotope therapy, this involves radioactive material being taken by mouth as a capsule or liquid, or given by injection. The material spreads throughout the body, but particularly targets cancer cells. It delivers high doses of radiation to kill cancer cells with minimal damage to normal tissues.

Different radionuclides are used to treat different cancers. The most common radionuclide therapy is radioactive iodine, which is taken as a capsule and used to treat certain types of thyroid cancer.

► See our *Understanding Thyroid Cancer* booklet.

Other radionuclide therapies include:

- peptide receptor radionuclide therapy (PRRT), which uses a small amount of a radioactive substance that has been combined with a cell-targeting protein (peptide). PRRT is given by an injection to treat neuroendocrine tumours (NETs) of the bowel, pancreas and lung

- injection of a radioactive material combined with prostate specific membrane antigen to treat some advanced prostate cancers
- injection of a radioactive material with a substance called metaiodobenzylguanidine to treat some types of NETs or neuroblastoma
- injection with a small amount of bone-seeking radioactive liquid to target cancer that has spread to the bone
- injection of radioactive antibodies to treat lymphoma.

SIRT – Also known as radioembolisation, SIRT stands for selective internal radiation therapy. This method uses tiny radioactive beads to deliver high doses of radiation to the liver. The beads are injected into a thin tube called a catheter, which is inserted into the main artery that supplies blood to the liver.

Radiation from the beads damages the cancer cells and their blood supply. This means the cancers can't get the nutrients they need and they shrink.

► See our *Understanding Cancer in the Liver* booklet.

Key points about brachytherapy

What it is

Brachytherapy is a form of internal radiation therapy that directly targets and destroys cancer cells.

How brachytherapy is given

- Sealed radioactive sources (such as seeds, needles, wires or pellets) are put into your body inside or near the cancer.
 - How long the radiation sources are left in place varies and depends on the dose you are having.
 - In temporary brachytherapy, the radiation source is inserted using an applicator. Temporary sources can remain in place for minutes, hours or days.
 - In permanent brachytherapy, the radioactive source is implanted in the body and will not be removed.
 - For some types of temporary brachytherapy, you may need to stay in hospital in an isolated room, and visitors may be restricted.
-

Safety of brachytherapy

- No radiation will be left in your body after a temporary implant is removed.
 - If you have a permanent implant, the risk of exposing other people to radiation is very low, but you may need to avoid contact with young children and pregnant women for a short time.
 - Your treatment team will advise you of any precautions you need to take.
-



Managing side effects

Radiation therapy can treat many cancers, but it can also injure healthy cells at or near the treatment area. This can lead to side effects. Before recommending radiation therapy, the radiation oncologist will consider whether the likely benefits outweigh the possible side effects. To minimise side effects, a range of new techniques have made radiation therapy highly precise (see pages 28–29).

This chapter provides information and tips to help you manage some common side effects of radiation therapy. These include fatigue, skin problems, hair loss, appetite loss, nausea, mouth and throat problems, bowel and bladder problems, and infertility.

Preparing for side effects

Some people experience many side effects, while others have very few or none. Side effects can vary even among people having the same type of radiation therapy to the same part of the body. Many factors can affect the type and severity of side effects, including:

- the part of the body treated
- the type of radiation therapy
- the dose of radiation needed
- any other treatments you might be having
- your general health.

Most side effects that occur during treatment are manageable. Before treatment begins, your radiation therapy team will discuss how to look after the treatment area, the side effects to watch out for or report, ways to manage them, and who to contact after hours if you need help.

If the side effects are severe, the radiation oncologist may change the treatment schedule or arrange a break. They may not recommend these options if it would affect how well the treatment works.

It is important to maintain your general health during treatment. People who have diabetes need to manage their blood sugar levels to keep them healthy during treatment and recovery – see your GP before treatment starts.

Trying complementary therapies

Complementary therapies are designed to be used along with conventional medical treatments. Therapies such as relaxation and mindful meditation can reduce anxiety and improve your mood.

Let your radiation oncologist know about any complementary therapies you are using or thinking about trying, as some may not be safe. This includes over-the-counter medicines, vitamins and creams, which may affect the way radiation therapy works or make side effects worse. You may also need to avoid massaging the treatment area.

► See our *Understanding Complementary Therapies* booklet.

How long side effects may last

Radiation therapy can cause side effects during and just after treatment. These are called short term or acute effects. Most side effects go away after treatment. But sometimes radiation therapy can cause long term or late effects months or years down the track.

During treatment, tell your radiation therapy team about any side effects, as side effects can usually be controlled with the right care and medicine.

Short-term side effects

Side effects often build up slowly during treatment and it could be a few days or weeks before you notice anything. Often the side effects are worse at the end of treatment, or even a week or two afterwards, because it takes time for the healthy cells to recover from radiation. Most side effects are temporary and go away in time, usually within a few weeks of treatment finishing.

Long-term or late side effects

Radiation therapy can also cause side effects that last for months or years after treatment. These long-term effects are usually mild, they may come and go, and they may not have any major impact on your daily life. However, sometimes they may be more serious. Late side effects may go away or improve on their own, but some may be permanent and need to be treated or managed.

Very rarely, years after successful treatment, patients can develop a new unrelated cancer in or near the area treated. The risk of this late effect is very low, but other factors, such as continuing to smoke or very rare genetic conditions, can increase this risk.

Radiation therapy to the chest, particularly when combined with chemotherapy, may lead to an increased risk of heart problems. Newer radiation therapy techniques have reduced the risk, however, talk to your doctor about your heart health. If you develop heart problems later in life, make sure you let your doctors know you had radiation therapy.

“I read a lot about all the negative side effects you might get from radiation therapy, but I’ve had no long-term side effects.” DEREK

Fatigue

Feeling very tired and lacking energy (fatigue) for day-to-day activities is the most common side effect of radiation therapy to any area of the body. During treatment, your body uses a lot of energy dealing with the effects of radiation on normal cells. Fatigue can also be caused by travelling to daily treatment sessions and other appointments.

Fatigue usually builds up slowly during the course of treatment, particularly towards the end, and may last for some weeks or months after treatment finishes. Many people find that they cannot do as much as they normally would, but others are able to continue their usual activities.

► See our *Fatigue and Cancer* fact sheet and *Exercise for People Living with Cancer* booklet.



How to manage fatigue

- Take regular breaks.
- Plan activities for the time of day when you tend to feel more energetic.
- Ask family and friends for help (e.g. with shopping, housework and driving).
- Take a few weeks off work during or after treatment, reduce your hours, or work from home. Discuss your situation with your employer.
- Do some regular exercise, such as walking. This can boost your energy levels and make you feel less tired. Ask your treatment team about what type of exercise is suitable for you.
- Limit caffeinated drinks, such as cola, coffee and tea. While caffeine may give a burst of energy, it can make you feel jittery and irritable, and cause insomnia and dehydration.
- Avoid drinking alcohol. If you smoke, try to quit (see page 14).
- Eat a healthy, well-balanced diet, and don't skip meals.

Skin changes

Depending on the part of the body treated, EBRT may make skin in the treatment area dry, itchy and flaky. Your skin may change in colour (look red, sunburnt or tanned) and may feel painful. Skin changes often start 10–14 days after the first treatment. They often get worse during treatment, before improving in the weeks after treatment.

You may need dressings and creams to help the area heal, avoid infection and make you more comfortable. Pain medicine can help if the skin is very sore. Let your radiation therapy team know about skin changes, such as cracks or blisters, moist areas, rashes, infections, swelling or peeling.



Taking care of your skin

- Clean your skin with warm water and a mild unscented soap. Gently pat skin dry with a soft towel rather than rubbing it.
- Ask your doctor or nurse what type of cream to use to moisturise the skin.
- Start moisturising your skin from the first day treatment starts, even before you notice any skin changes.
- Let temporary skin markings wear off by themselves. Don't scrub your skin to remove them.
- Avoid using razors, hair dryers, hot water bottles, heat packs, wheat bags or icepacks on the area that has been treated.
- Apply sunscreen and wear a broad-brimmed hat when outside. Stay out of the sun where possible.
- Wear loose, soft cotton clothing. Avoid tight-fitting items, belts, underwire bras, jewellery or collars over the treatment area.
- Avoid chlorinated swimming pools, and spas and saunas. Check with your doctor about swimming in the sea.

Hair loss

If you have hair in the area being treated, you may lose some or all of it during or just after radiation therapy. The hair will usually grow back a few months after treatment has finished, but it may be thinner or have a different texture. Hair loss may be permanent with higher doses of radiation therapy.

When cancers on one part of the face or head are treated, hair on the other side of the head may be lost temporarily due to radiation passing from one side to the other.

► See our *Hair Loss* fact sheet.



Ways to manage hair loss

- If you are having radiation therapy to your head or scalp area, think about cutting your hair short before treatment starts. Some people say this gives them a sense of control.
- Wear a wig, hairpiece or leave your head bare. Do whatever feels comfortable and makes you feel confident.
- Protect your scalp against sunburn and the cold with a hat, beanie, turban or scarf.
- If you plan to wear a wig, choose it before treatment starts so you can match it to your own hair colour and style. For more information about wig services, call Cancer Council 13 11 20.
- Ask your hairdresser or barber how to style your hair. It may be thinner, or curly when it was once straight, and the new growth may be patchy for a while.
- Contact the Look Good Feel Better program. It helps people manage the appearance-related side effects caused by cancer treatment. Workshops are run for adults and teenagers. Visit lgfb.org.au.

Appetite loss and nausea

Some people may lose interest in food or find it difficult to eat well during radiation therapy. This can depend on the part of the body being treated. It is important to try to keep eating well so you get the nutrition you need to maintain your weight. Good nutrition will give you more strength, help manage side effects, and improve how you respond to treatment.

Radiation therapy near the abdomen, pelvic region or head – You may feel sick (nauseated), with or without vomiting, for several hours after each treatment. Your radiation oncologist may prescribe medicine (antiemetic) to take at home before and after each session to prevent nausea. If you are finding nausea difficult to manage, talk to the radiation oncologist or nurse, or call Cancer Council 13 11 20.

Radiation therapy to the head and neck area – Chewing or swallowing may be difficult or painful. Your sense of taste may also change if radiation therapy has affected the salivary glands or tastebuds. In some cases, taste changes may be permanent.

If you are finding it difficult to eat well and get the nutrition you need, a dietitian can suggest changes to your diet, liquid supplements or a feeding tube. Dietitians work in all public and most private hospitals. You can ask your cancer care team if they can arrange an appointment with a dietitian. To find an accredited practising dietitian in your area, visit dietitiansaustralia.org.au.

“At first, I couldn’t think about eating without thinking about throwing up. Drinking ginger beer helped control the nausea.” SIMON



How to manage appetite changes

Appetite loss

- Eat 5–6 small meals each day rather than a few large meals.
- Try to eat extra on days when you have an appetite.
- Ask for a referral to a dietitian to get advice on what to eat during treatment and recovery.
- If you don't feel like eating solid foods, enrich your drinks with powdered milk, yoghurt, eggs or honey.
- Do not use nutritional supplements or medicines without your doctor's advice, as some could affect treatment.
- Cooking smells may put you off eating. It might help if someone else prepares your food, or you could reheat precooked meals.
- Try to do some light physical activity, such as walking. This may improve your appetite.
- Let your treatment team know if you are having trouble eating or if your weight has changed.

Nausea

- Have a bland snack (e.g. toast and apple juice) before each session.
- Try food and drinks with ginger or peppermint to help reduce nausea.
- Sip on water and other fluids throughout the day to prevent dehydration.
- Eat dry biscuits, crackers or toast. If nausea is a problem in the morning, have a dry cracker before getting out of bed.
- Ask your doctor if you can try anti-nausea medicine. Take this as prescribed and tell your doctor if the medicine doesn't help – it may take some time to find one that works for you.
- Contact your treatment team if the symptoms of nausea don't improve after a few days, or if you have been vomiting for more than 24 hours.
- ▶ See our *Nutrition and Cancer* booklet and listen to our "Appetite Loss and Nausea" podcast episode.

Mouth and throat problems

Radiation therapy is often used to treat cancers in the mouth, throat, neck or upper chest region. Depending on the area treated, radiation therapy may affect your mouth and teeth. This can make eating and swallowing difficult, and change your sense of taste.

Taste and swallowing changes – You may have thick phlegm in your throat, or a lump-like feeling that makes it hard to swallow. Food may also taste different. Normal taste usually returns in time. Sometimes, swallowing may be affected for months after treatment, but it is rare for problems to be permanent.

Dry mouth and other issues – After treatment, your mouth or throat may become dry and sore, and your voice may become hoarse. Radiation therapy can cause your salivary glands to make less saliva, which can contribute to a dry mouth. These effects will gradually get better after treatment finishes, but it may take several weeks or even months. In some cases, the effects may improve but not completely disappear. Dry mouth (xerostomia) can make chewing, swallowing and talking difficult. A dry mouth can also make it harder to keep your teeth and mouth clean, which can increase the risk of tooth decay.

Teeth problems – Radiation therapy to the mouth may increase the chance of tooth decay or other problems in the future. You will need to have a thorough dental check-up and may need to have any decaying teeth removed before treatment starts. Your dentist can provide an oral health care plan with instructions on caring for your teeth and dealing with side effects such as mouth sores. You will need regular dental check-ups after treatment ends to prevent any problems in the future.

▶ See our *Mouth Health and Cancer Treatment* and *Understanding Taste and Smell Changes* fact sheets.



How to relieve mouth and throat problems

- Have a dental check-up before you start treatment. Ask for a referral to a dentist who specialises in the effect of radiation therapy on teeth.
- Keep your mouth moist by sucking on ice chips, mints and sipping cool drinks. Carry a water bottle with you.
- Ask your doctor, nurse or pharmacist for information about artificial saliva to moisten your mouth.
- Chew sugar-free gum to help the flow of saliva.
- If you have a dry mouth, you may need to avoid rough, crunchy or dry foods (e.g. chips, nuts, toast, dry biscuits); salty or spicy foods that sting your mouth; or very hot or cold food.
- Avoid smoking, drinking alcohol or caffeinated drinks, and having citrus or tangy tomato-based food and juice. These things will irritate your mouth and make dryness worse.
- Ask your doctor for a referral to a speech pathologist. They can suggest ways to modify the texture of foods so they are easier to swallow.
- If chewing and swallowing are painful, drink liquids using a straw or eat soft or minced textured foods.
- Ask a dietitian for suggestions on meals and snacks to try, or see our *Nutrition and Cancer* booklet for ideas.
- To manage taste changes, add more flavour to food (e.g. add lemon juice to meat and vegetables, marinate foods, use herbs and spices).
- Talk to your doctor if eating is uncomfortable or difficult. If you are in pain, ask them about pain medicine to help with swallowing.
- Rinse your mouth often – when you wake up, after you eat or drink, and at bedtime. Ask your doctor or nurse what type of alcohol-free mouthwash to use and how often to use it. They may give you an easy recipe for a homemade mouthwash.

Bowel changes

If you're having radiation to the pelvic area, the radiation therapists may advise you to drink fluids before each radiation treatment so you have a full bladder. This will expand your bladder and push the bowel higher up into the abdomen, away from the radiation.

Even with precautions, radiation therapy can irritate the lining of the bowel or stomach and affect the way the bowel works. These changes are usually temporary, but for some people they are permanent and can have a major impact on quality of life. It is important to talk to your treatment team if you are finding bowel issues difficult to manage.

Diarrhoea – This is when you have frequent loose, watery bowel motions. Diarrhoea can also cause abdominal cramping, wind and pain. After radiation therapy, you will need to go to the toilet more urgently and more often. Having diarrhoea can be tiring, so rest as much as possible and ask others for help. Diarrhoea can take some weeks to settle down after treatment has finished.

Radiation proctitis – Radiation therapy to the pelvic area can damage the lining of the rectum, causing inflammation and swelling known as radiation proctitis. Symptoms may include blood and mucus in bowel motions; discomfort opening the bowels; or the need to empty the bowels often, perhaps with little result. Ask your treatment team about your risk of developing radiation proctitis. Radiation proctitis is usually short term but may be ongoing in a small number of people. If you have any ongoing problems, they may refer you to a gastroenterologist.

“I had diarrhoea for a few weeks but it improved with medication.” EMMA



How to manage bowel changes

- Ask your doctor about suitable medicines for diarrhoea. Take as directed.
- Check with your treatment team before taking any over-the-counter or home remedies, as taking them with anti-diarrhoea medicines may cause unwanted effects.
- Drink peppermint or chamomile tea to reduce abdominal or wind pain.
- Eat or drink as well as you can to give your body the nutrients it needs.
- Do some gentle exercise, such as walking, to encourage healthy bowel movements. Check with your doctor about the amount and type of exercise that is right for you.
- Avoid alcohol and cut down on coffee, cola and other drinks that contain caffeine.
- Drink plenty of clear liquids when you first notice symptoms of diarrhoea. This helps to avoid dehydration and replaces fluids lost through diarrhoea. Try apple juice, weak tea, clear broth, sports drinks and electrolyte-replacing fluids. It may also be worth trying a lactose-free milk.
- Choose plain foods that are low in insoluble fibre (e.g. bananas, mashed potato, apple sauce, white rice or pasta, white bread, steamed white fish or chicken). Talk to your dietitian about what else you can eat.
- If you have diarrhoea, avoid high-fibre, fatty or fried foods; pulses; garlic and onion; and rich sauces and gravies, as these can make diarrhoea worse.
- Contact your treatment team immediately if there is blood in your bowel motions or if you have more than 5–6 bowel movements in 24 hours.

Bladder changes

Radiation therapy to the abdomen or pelvic area can irritate the bladder or, more often, the urethra (the tube that carries urine from the bladder to the outside of the body).

Cystitis – You may feel you want to pass urine more often or you might have some stinging when you pass urine. This is called cystitis. The symptoms usually ease within 3 months of finishing radiation therapy.

Urinary incontinence – Incontinence is when urine leaks from your bladder without your control. After radiation therapy, you may need to pass urine more often, particularly at night, or feel as if you need to go in a hurry. You may leak a few drops of urine when you cough, sneeze, laugh or strain.

Ways to manage bladder changes

Strengthening the pelvic floor muscles can help with bladder control. Ask your doctor for a referral to a continence nurse or physiotherapist, or contact the National Continence Helpline on 1800 33 00 66 or at continence.org.au.

Let your treatment team know if you have bladder or urinary problems, as they will be able to suggest strategies and may recommend medicines. To help manage these side effects, drink plenty of fluids, limit strong coffee and tea, and avoid drinking alcohol.



The blood vessels in the bladder and bowel can become more fragile after radiation therapy. This may mean you see blood in your urine or bowel motions, even months or years after treatment. Always let your doctor know if you notice new or unusual bleeding.

Lymphoedema

Lymphoedema is swelling that occurs in soft tissue. If lymph nodes or lymph vessels have been damaged during radiation therapy, lymph fluid may not drain properly. If lymph fluid builds up, it can cause swelling in the area being treated. Lymphoedema usually occurs in an arm or leg, but can also affect other parts of the body. The main signs of lymphoedema include swelling, redness and skin warmth, which may come and go.

People who have had surgery followed by radiation therapy are more at risk. Lymphoedema or swelling is sometimes just a temporary effect of radiation therapy, but it can be ongoing. It can also be a late effect, appearing months or even years after treatment.

Ways to manage lymphoedema

Lymphoedema is easier to manage if the condition is treated early. Treatment will aim to improve the flow of lymph fluid. It is important to avoid pressure, injury or infection to the affected part of your body, and to see your doctor if you have any signs of lymphoedema.

Some hospitals have specialist physiotherapists who can teach you simple exercises to reduce your risk of developing lymphoedema or show you ways to manage it if you have developed it. There are also outpatient and private lymphoedema practitioners.

Lymphoedema practitioners can develop a personalised treatment program. This may include exercises, skin care, lymphatic drainage massage and compression garments, if needed. To find a lymphoedema practitioner, visit the Australasian Lymphology Association at lymphoedema.org.au and click on “Find a Practitioner”.

► See our *Understanding Lymphoedema* fact sheet.



Radiation therapy can cause the skin or internal tissue in the treatment area to become less stretchy and harden. This is known as fibrosis. It can occur weeks or months after treatment and cause pain, lack of flexibility and narrowing of passages (such as the vagina or rectum). Let your treatment team know if you develop any new pain or stiffness, as early treatment can help.

Sexuality, intimacy and fertility issues

Radiation therapy can affect your sexuality and fertility in emotional and physical ways. These changes are common. Some changes may be temporary, while others may be permanent.

Changes in sexuality

You may notice a lack of interest in sex or a loss of desire (libido), or you may feel too tired or unwell to want to be intimate. You may feel less sexually attractive to your partner because of changes to your body. All of these feelings are quite common. Radiation therapy can also make sexual intercourse uncomfortable, depending on where the radiation therapy is given (see pages 56–57). Talk to your doctor about ways to manage side effects that change your sex life.

Using contraception

A woman's eggs (ova) and a man's sperm can be affected by very small amounts of radiation when having radiation therapy to any part of the body. Depending on the type of radiation therapy you have, your doctor may talk to you about using a barrier method of contraception (such as a condom or female condom). If pregnancy is possible, your doctor will advise you to avoid pregnancy by using contraception during radiation therapy and for at least six months after you have finished treatment. Talk to your doctor as soon as possible if pregnancy occurs.

Changes in fertility

The risk of infertility (difficulty getting pregnant or conceiving a child) will depend on the area treated, the dose of radiation therapy and the number of treatment sessions. If you are treated with both radiation therapy and chemotherapy (chemoradiation), the risk of infertility is higher.

Radiation therapy to the pelvic area, abdomen and sexual organs can affect your fertility, which can be temporary or permanent. Radiation therapy to the brain can damage the pituitary gland, which controls the hormones the body needs to produce eggs or sperm.

If infertility is a potential side effect, your radiation oncologist will discuss it with you before treatment starts. Let them know if you think you may want to have children in the future. Ask what can be done to reduce the chance of problems and whether you should see a fertility specialist beforehand. Sometimes, however, it is not possible to properly treat the cancer and maintain fertility.

Many people feel a sense of loss when they learn they may no longer be able to have children. If you have a partner, talk to them about your feelings. Talking to a counsellor may also help.

- ▶ See the table on the next two pages for some ways to manage common impacts on your sex life and fertility, and see our *Sexuality, Intimacy and Cancer* and *Fertility and Cancer* booklets.

“I didn’t really realise the radiation would affect my sexuality until it happened. I don’t think anyone can tell you what the pain, discomfort and exhaustion will do to you.” DONNA

Effect of radiation therapy on sexual function and fertility

Radiation therapy to the abdomen, pelvis and reproductive organs can affect your sexual function and ability to have children.

Changes to the vagina

- Radiation therapy to the vulva or vagina may cause inflammation, making intercourse painful. This usually improves in the weeks after treatment ends. Your treatment team will recommend creams and pain relief to use until the skin heals.
- Talk to your doctor about using vaginal moisturisers, which may help with discomfort. In some cases, oestrogen creams are prescribed.
- The vagina may become shorter and narrower (vaginal stenosis), making intercourse difficult or painful. Having regular intercourse or using vaginal dilators after treatment ends can help keep the vagina open. Wait until any soreness or inflammation has settled before you start using a dilator or having sexual intercourse. This is usually 2–6 weeks after your last session of radiation therapy. Using a dilator can be challenging. Your doctor, nurse or a physiotherapist can provide instructions.
- If sexual penetration is painful or difficult, explore other ways to orgasm or climax.

Menopause

- Radiation therapy to the pelvic area or abdomen usually stops the ovaries producing female hormones, which leads to early menopause.
- Your periods will stop and you may have menopausal symptoms. These may include hot flushes, dry skin, vaginal dryness, mood swings, trouble sleeping (insomnia) and tiredness.
- If vaginal dryness is a problem, take more time before and during sex to become aroused. Using lubrication may also make intercourse more comfortable.
- Discuss changes to your libido with your partner so they understand how you're feeling.
- Ask your GP to arrange a bone density test to check for osteoporosis or osteopaenia, which can develop after menopause.
- Talk to your doctor about ways to manage the symptoms of menopause. If you need support resuming sexual activity, ask your doctor for a referral to a sexual therapist or psychologist.

Sperm and erection problems

- Radiation therapy to the pelvic area or near the testicles may temporarily affect how much sperm you make. This is called a dry orgasm. You may feel the sensations of orgasm, but ejaculate little or no semen. Semen production often returns to normal after a few months.
- Depending on the dose and the area of the pelvis treated, you may have trouble getting and keeping an erection firm enough for intercourse. This is called erectile dysfunction or impotence. Ejaculation may be painful for a few weeks after treatment. Sometimes impotence may be permanent.
- Talk to your treatment team if erection problems are ongoing and causing you distress. They can suggest ways to keep your penis erect, such as prescription medicines, penile implants or vacuum erection devices.

Infertility

- Sometimes, changes to sperm production and ability to have erections are permanent. This may cause infertility. If you want to have a child, you may wish to store sperm before treatment starts so your partner can conceive through artificial insemination or in-vitro fertilisation in the future.
- If radiation therapy causes menopause, you will no longer be able to become pregnant. If you wish to have children in the future, talk to your radiation oncologist before treatment starts about ways to preserve your fertility, such as storing eggs or embryos or freezing ovarian tissue.
- If your ovaries don't need to be treated, one or both of the ovaries may be surgically moved higher in the abdomen and away from the field of radiation. This is called ovarian transposition or relocation (oophoropexy). It may lower the amount of radiation you receive and it may help the ovaries keep working properly.

Key points about side effects

Why side effects occur

- Many people experience side effects from radiation therapy.
- Side effects are caused when the radiation therapy damages healthy cells near the treatment area.

How long side effects last

- Many side effects are temporary and occur during treatment or just after. They can take several weeks to get better.
- In some cases, side effects may be permanent.
- Some side effects can happen months or years after treatment ends. These are called late effects.

Common side effects

- Radiation therapy can cause fatigue, skin problems, appetite loss, nausea, mouth and throat problems, bladder and bowel changes, hair loss and lymphoedema.
- Radiation therapy can affect your sexuality and fertility in emotional and physical ways. These changes may be temporary or permanent.
- If you would like to have children in the future, talk to your doctor before treatment starts.

Managing side effects

- Your radiation therapy team will suggest ways to prevent and manage side effects. You may be prescribed medicine or given suggestions for eating, drinking and looking after yourself.
- You will be advised to avoid pregnancy during treatment and for some time afterwards. You may be advised to use barrier contraception.

Life after treatment

For most people, the cancer experience doesn't end on the last day of radiation therapy. Radiation therapy usually does not have an immediate effect, and it could take days, weeks or months to see any change in the cancer. The cancer cells may keep dying for weeks or months after the end of treatment. It may be some time before you know whether the radiation therapy has controlled the cancer.

After radiation therapy has finished, your treatment team will tell you how to look after the treatment area and recommend ways to manage side effects. They will also advise who to call if you have any concerns.

Life after cancer treatment can present its own challenges. You may have mixed feelings when treatment ends, and worry that every ache and pain means the cancer is coming back.

Dealing with feelings of sadness

If you have continued feelings of sadness, have trouble getting up in the morning or have lost motivation to do things that previously gave you pleasure, you may be experiencing depression. This is quite common among people who have had cancer.

Talk to your GP, because counselling or medication – even for a short time – may help. Some people can

get a Medicare rebate for sessions with a psychologist. Cancer Council may also run a counselling program in your area.

For information about coping with depression and anxiety, call Beyond Blue on 1300 22 4636 or visit beyondblue.org.au. For 24-hour crisis support, call Lifeline 13 11 14 or visit lifeline.org.au.

Some people say that they feel pressure to return to “normal life”. It is important to allow yourself time to adjust to the physical and emotional changes, and establish a new daily routine at your own pace. Your family and friends may also need time to adjust.

Cancer Council 13 11 20 can help you connect with other people who have had cancer, and provide you with information about the emotional and practical aspects of living well after cancer.

► See our *Living Well After Cancer* booklet.

Follow-up appointments

You will have regular check-ups with the radiation oncologist at the treatment centre. These will become less frequent over time.

You may also have follow-up appointments with nurses from your treatment centre to help manage any ongoing symptoms, as well as regular check-ups with other specialists who have been involved in your treatment. You will receive continued support from allied health professionals, such as a dietitian, physiotherapist or speech pathologist, if you need it.

When a follow-up appointment or test is approaching, many people find that they think more about the cancer and may feel anxious. Talk to your treatment team or call Cancer Council 13 11 20 if you are finding it hard to manage this anxiety.

Let your treatment team know immediately if you have any health problems between follow-up appointments. Many of the long-term or late effects of radiation therapy (see page 42) can be managed better if identified early.

Support from Cancer Council

Cancer Council offers a range of services to support people affected by cancer, their families and friends. Services may vary by location.

Cancer Council 13 11 20



Our experienced health professionals will answer any questions you have about your situation and link you to local services (see inside back cover).

Information resources



Cancer Council produces booklets and fact sheets on more than 25 types of cancer, as well as treatments, emotional and practical issues, and recovery. Call 13 11 20 or visit your local Cancer Council website.

Legal and financial support



If you need advice on legal or financial issues, we can refer you to qualified professionals. These services are free for people who can't afford to pay. Financial assistance may also be available. Call Cancer Council 13 11 20 to ask if you are eligible.

Practical help



Cancer Council can help you find services or offer guidance to manage the practical impacts of cancer. This may include helping you access accommodation and transport services.

Peer support services



You might find it helpful to share your thoughts and experiences with other people affected by cancer. Cancer Council can link you with individuals or support groups by phone, in person, or online. Call 13 11 20 or visit cancerCouncil.com.au/OC.

Useful websites

You can find many useful resources online, but not all websites are reliable. These websites are good sources of support and information.

Australian

Cancer Council Australia	cancer.org.au
Cancer Council Online Community	cancercouncil.com.au/OC
Cancer Council podcasts	cancercouncil.com.au/podcasts
Guides to Best Cancer Care	cancer.org.au/cancercareguides
Cancer Australia	canceraustralia.gov.au
Carer Gateway	carergateway.gov.au
Department of Health	health.gov.au
eviQ Cancer Treatments Online	eviq.org.au
Healthdirect Australia	healthdirect.gov.au
Radiation Oncology: Targeting Cancer	targetingcancer.com.au
Services Australia (including Centrelink and Medicare)	servicesaustralia.gov.au
TROG Cancer Research	trog.com.au

International

American Cancer Society	cancer.org
Cancer Research UK	cancerresearchuk.org
Macmillan Cancer Support (UK)	macmillan.org.uk
National Cancer Institute (US)	cancer.gov

Caring for someone with cancer

You may be reading this booklet because you are caring for someone with cancer. What this means for you will vary depending on the situation. Being a carer can bring a sense of satisfaction, but it can also be challenging and stressful.

It is important to look after your own physical and emotional wellbeing. Give yourself some time out and share your concerns with somebody neutral such as a counsellor or your doctor, or try calling Cancer Council 13 11 20. There is a wide range of support available to help you with the practical and emotional aspects of your caring role.

Support services – Support services such as Meals on Wheels, home help or visiting nurses can help you in your caring role. You can find local services, as well as information and resources, through the Carer Gateway. Call 1800 422 737 or visit carergateway.gov.au.

Support groups and programs – Many cancer support groups and cancer education programs are open to carers as well as to people with cancer. Support groups and programs offer the chance to share experiences and ways of coping.

Carers Australia – Carers Australia provides information and advocacy for carers. Visit carersaustralia.com.au.

Cancer Council – You can call Cancer Council 13 11 20 or visit your local Cancer Council website to find out more about carers' services.

▶ See our *Caring for Someone with Cancer* booklet.

Question checklist

Asking your doctor questions will help you make an informed choice. You may want to include some of the questions below in your own list.

Treatment

- Why do I need radiation therapy?
 - What are the advantages and disadvantages of radiation therapy for me?
 - How successful is radiation therapy for the type of cancer I have?
 - What kind of radiation therapy will I have?
 - Will it be my only treatment, or will I have other treatments?
 - How long will treatment take? How will it be given?
 - Where can I have this treatment? Will I have to travel away from home?
 - Will I have radiation therapy as an inpatient or outpatient?
 - How will I know if the treatment is working?
 - Are there any out-of-pocket expenses not covered by Medicare or my private health cover? Can the cost be reduced if I can't afford it?
 - Are there clinical guidelines you are following?
 - Are there any clinical trials or research studies I could join?
-

Side effects

- What are the risks and possible side effects of radiation therapy?
 - Will any side effects be long-term or short-term?
 - Will I be radioactive? Will my partner be affected?
 - Is it safe to have sex during the course of radiation therapy?
 - Will radiation therapy interact with any other medicines or vitamins I take?
 - Can I work, drive and do my normal activities while having treatment?
 - Are there any complementary therapies that might help me?
 - Should I change my diet or physical activity during or after treatment?
 - Who should I contact if I have a problem during treatment? Who is my after-hours contact?
-

After treatment

- How often will I need check-ups after treatment?
 - If the cancer returns, how will I know? What treatments could I have?
-

Glossary

adjuvant therapy

A treatment given after the main treatment to lower the risk that the cancer will come back (recur).

advanced cancer

Cancer that is unlikely to be cured. In most cases, the cancer has spread to other parts of the body (secondary or metastatic cancer). Treatment can often still control the cancer and manage symptoms.

allied health professional

A university-qualified professional who supports a person's medical care.

applicator

Thin plastic tube (catheter) or cylinder that is used to insert a radiation source into the body for brachytherapy.

brachytherapy

A type of internal radiation therapy in which sealed radioactive sources are placed inside the body, close to or into the cancer. May be temporary or permanent.

cells

The basic building blocks of the body. A human is made of billions of cells that perform different functions.

chemoradiation

Treatment that combines radiation therapy with chemotherapy. Also called chemoradiotherapy.

chemotherapy

A cancer treatment that uses drugs to kill cancer cells or slow their growth. May be given alone or with other treatments.

clinical trial

A research study that tests new approaches to prevention, screening, diagnosis or

treatment, to see if they are better than current approaches.

course

A period of radiation therapy treatment.

CT scan

Computerised tomography scan. This scan uses x-rays to create cross-sectional pictures of the body. It is often used to help plan a course of radiation therapy.

curative treatment

Treatment given with the aim of causing signs and symptoms of cancer to reduce or disappear.

external beam radiation therapy (EBRT)

Radiation therapy delivered to the cancer from outside the body.

fertility

The ability to conceive a child.

fraction

The individual, usually daily, dose of radiation that makes up part of a course of radiation therapy.

Gamma Knife

A type of stereotactic radiosurgery.

hormone therapy

A treatment that blocks the body's natural hormones, which sometimes help cancer cells grow.

image-guided radiation therapy (IGRT)

The use of imaging techniques, such as x-ray or CT scans, at the start of each radiation therapy session to guide the radiation beam during treatment.

immobilisation device

A device, such as a mask, breast board or cushion, that helps keep a person in the same position during radiation therapy.

immunotherapy

Drugs that use the body's own immune system to fight cancer.

infertility

The inability to conceive a child.

intensity-modulated radiation therapy (IMRT)

A highly accurate type of external beam radiation therapy that shapes and divides multiple radiation beams into many beamlets that vary in strength.

internal radiation therapy

Radiation therapy delivered to the cancer from within the body. Brachytherapy is the most common type of internal radiation therapy. Other types include radionuclide therapy and SIRT (selective internal radiation therapy).

linear accelerator (LINAC)

The most common type of machine used to deliver external beam radiation therapy. It uses high-energy x-ray or electron beams.

lymph nodes

Small, bean-shaped structures found in groups throughout the body. They help protect the body against disease and infection. Also called lymph glands.

lymphoedema

Swelling caused by a build-up of lymph fluid.

menopause

When a woman stops having periods (menstruating). This can happen naturally; from treatment; or because the ovaries have been removed.

metastasis (plural: metastases)

Cancer that has spread from a primary

cancer in another part of the body. Also called secondary or advanced cancer.

MRI scan

Magnetic resonance imaging scan. A scan that uses magnetic fields and radio waves to take detailed cross-sectional pictures of the body.

neoadjuvant treatment

A treatment given before another treatment to make that treatment more successful.

nuclear medicine specialist

Coordinates the delivery of radioactive iodine treatment and nuclear scans.

palliative treatment

Medical treatment for people with advanced cancer to help them manage pain and other physical and emotional symptoms.

PET-CT scan

Positron emission tomography scan combined with CT scan. In a PET scan, a person is injected with a small amount of radioactive solution. This makes cancerous areas show up brighter on the scan and target treatment accurately.

proton therapy

A specialised form of external beam radiation therapy that uses radiation from protons rather than x-rays.

radiation

Energy in the form of waves or particles, including gamma rays and x-rays. This energy is harmful to cells and is used in radiation therapy to destroy cancer cells.

radiation therapy

The use of targeted radiation to kill or damage cancer cells so they cannot grow, multiply or spread. The radiation is usually in the form of x-ray beams. Also called radiotherapy.

radionuclide therapy

The use of radioactive substances that can be taken by mouth as a capsule or liquid, or given by injection (intravenously). Also called radioisotope therapy.

selective internal radiation therapy (SIRT)

A type of internal radiation therapy used to treat liver cancers. Also called radioembolisation.

stereotactic radiosurgery (SRS), stereotactic radiation therapy (SRT), stereotactic body radiation therapy (SBRT) or stereotactic ablative body radiation therapy (SABR)

Types of external beam radiation therapy that deliver high doses of precise radiation.

surgery

A procedure performed by a surgeon to remove or repair a part of the body. Also known as an operation or surgical resection.

three-dimensional conformal radiation therapy (3DCRT)

A common type of external beam radiation therapy. A computer plans the treatment based on the location of the cancer. The radiation is then shaped (conformed) so that the cancer receives high doses of radiation, but surrounding tissues receive much less.

tissue

A collection of cells of similar type that make up an organ or structure in the body.

total body irradiation (TBI)

A type of radiation therapy used to treat blood cancers. TBI is sometimes used with chemotherapy before a stem cell or bone marrow transplant.

tumour

A new or abnormal growth of tissue on or in the body. A tumour may be benign (not cancer) or malignant (cancer).

ultrasound

A non-invasive scan that uses soundwaves to create a picture of part of the body.

volumetric modulated arc radiation therapy (VMAT)

A type of intensity-modulated radiation therapy in which the radiation machine rotates around the treatment area while continuously delivering x-ray beams to deliver an exceptionally accurate dose to the targeted area of the body.

x-ray

A type of radiation that can be used for imaging (e.g. low-energy beams from a CT or x-ray machine) or radiation therapy (low-, medium- or high-energy treatment beams).

Can't find a word here?

For more cancer-related words, visit:

- cancercouncil.com.au/words
 - cancervic.org.au/glossary
-

Reference

1. M B Barton et al., "Estimating the demand for radiotherapy from the evidence: A review of changes from 2003 to 2012", *Radiotherapy and Oncology*, vol. 112, iss. 1, 2014, pp. 140–44.



How you can help

At Cancer Council, we're dedicated to improving cancer control. As well as funding millions of dollars in cancer research every year, we advocate for the highest quality care for cancer patients and their families. We create cancer-smart communities by educating people about cancer, its prevention and early detection. We offer a range of practical and support services for people and families affected by cancer. All these programs would not be possible without community support, great and small.

Join a Cancer Council event: Join one of our community fundraising events such as Daffodil Day, Australia's Biggest Morning Tea, Relay For Life, Girls' Night In and other Pink events, or hold your own fundraiser or become a volunteer.

Make a donation: Any gift, large or small, makes a meaningful contribution to our work in supporting people with cancer and their families now and in the future.

Buy Cancer Council sun protection products: Every purchase helps you prevent cancer and contribute financially to our goals.

Help us speak out for a cancer-smart community: We are a leading advocate for cancer prevention and improved patient services. You can help us speak out on important cancer issues and help us improve cancer awareness by living and promoting a cancer-smart lifestyle.

Join a research study: Cancer Council funds and carries out research investigating the causes, management, outcomes and impacts of different cancers. You may be able to join a study.

To find out more about how you, your family and friends can help, please call your local Cancer Council.



Cancer Council

13 11 20

Being diagnosed with cancer can be overwhelming. At Cancer Council, we understand it isn't just about the treatment or prognosis. Having cancer affects the way you live, work and think. It can also affect our most important relationships.

When disruption and change happen in our lives, talking to someone who understands can make a big difference. Cancer Council has been providing information and support to people affected by cancer for over 50 years.

Calling 13 11 20 gives you access to trustworthy information that is relevant to you. Our experienced health professionals are available to answer your questions and link you to services in your area, such as transport, accommodation and home help. We can also help with other matters, such as legal and financial advice.

If you are finding it hard to navigate through the health care system, or just need someone to listen to your immediate concerns, call 13 11 20 and find out how we can support you, your family and friends.



If you need information in a language other than English, an interpreting service is available. Call 131 450.



If you are deaf, or have a hearing or speech impairment, you can contact us through the National Relay Service. communications.gov.au/accesshub/nrs

*Cancer Council services and programs vary in each area.
13 11 20 is charged at a local call rate throughout Australia (except from mobiles).*

For information & support
on cancer-related issues,
call **Cancer Council 13 11 20**

Visit your local Cancer Council website

Cancer Council ACT
actcancer.org

Cancer Council Queensland
cancerqld.org.au

Cancer Council Victoria
cancervic.org.au

Cancer Council NSW
cancercouncil.com.au

Cancer Council SA
cancersa.org.au

Cancer Council WA
cancerwa.asn.au

Cancer Council NT
cancer.org.au/nt

Cancer Council Tasmania
cancer.org.au/tas

Cancer Council Australia
cancer.org.au

*This booklet is funded through the generosity of the people of Australia.
To support Cancer Council, call your local Cancer Council or visit your local website.*

