



Understanding Radiation Therapy

A guide for people with cancer,
their families and friends

A large yellow shape, resembling a stylized sun or a large drop, occupies the lower half of the page. On its right side, there is a purple circle containing the word "Treatment". A thin orange line extends from the bottom of the purple circle, curves to the left, and ends in a small telephone handset icon pointing towards the phone number.

Treatment

For information & support, call

13 11 20

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First published May 1995 as *Understanding Radiotherapy*. This edition December 2019.

© Cancer Council Australia 2019. ISBN 978 1 925651 69 0

Understanding Radiation Therapy is reviewed approximately every two years. Check the publication date above to ensure this copy is up to date.

Editor: Ruth Sheard. Designer: Eleonora Pelosi. Printer: SOS Print + Media Group.

Acknowledgements

This edition has been developed by Cancer Council NSW on behalf of all other state and territory Cancer Councils as part of a National Cancer Information Subcommittee initiative.

We thank the reviewers of this booklet: Dr Madhavi Chilkuri, Radiation Oncologist, Townsville Cancer Centre, The Townsville Hospital, and Dean, RANZCR Faculty of Radiation Oncology, QLD; Polly Baldwin, 13 11 20 Consultant, Cancer Council SA; Patricia Hanley, Consumer; Prof Michael Hofman, Nuclear Medicine and Molecular Imaging Physician, Peter MacCallum Cancer Centre, VIC; Leanne Hoy, Cancer Nurse Consultant, GenesisCare, VIC; Sharon King, Accredited Practising Dietitian, TAS; Dr Yoo Young (Dominique) Lee, Radiation Oncology Consultant, Princess Alexandra Hospital, QLD; Dr Wendy Phillips, Senior Medical Physicist, Department of Radiation Oncology, Royal Adelaide Hospital, SA; Katrina Rech, Radiation Therapist and Quality Systems Manager, GenesisCare, SA. We also thank the health professionals, consumers and editorial teams who have worked on previous editions of this title.

This booklet is funded through the generosity of the people of Australia.

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.



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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. 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. 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, 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).



**Cancer
Council**
13 11 20

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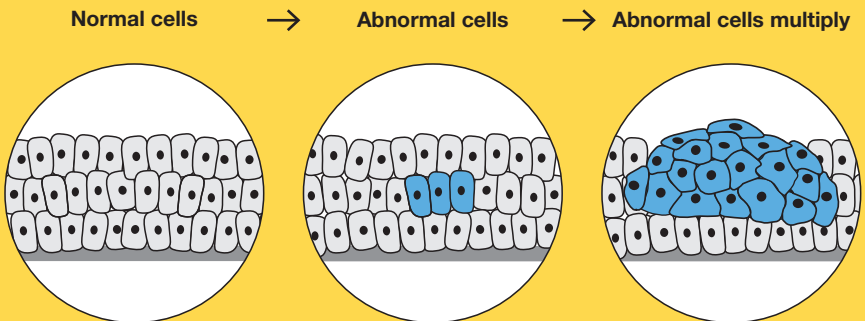
What is cancer?

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. 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.

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

How cancer starts

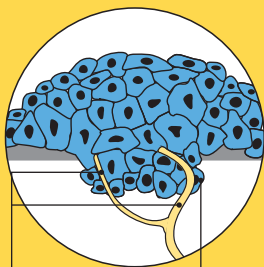


cancer. Cancerous tumours, also known as malignant tumours, have the potential to spread. They may invade nearby tissue, destroying normal cells. The cancer cells can break away and travel through the bloodstream or lymph vessels to other parts of the body.

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.

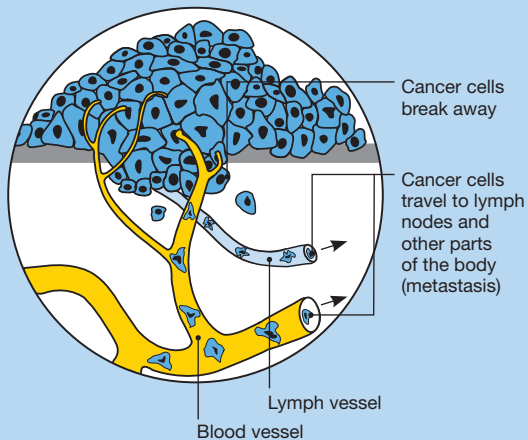
How cancer spreads

→ Malignant cancer



Grows own
blood vessels
(angiogenesis)

Invades
surrounding
tissue



Cancer cells
break away

Cancer cells
travel to lymph
nodes and
other parts of
the body
(metastasis)

Lymph vessel

Blood vessel



How cancer is treated

Cancers are usually treated with surgery, chemotherapy and radiation therapy. These treatments may be used on their own or in combination, for example, you may have surgery followed by radiation therapy. Other drug treatments, such as hormone therapy, targeted therapy and immunotherapy, can also be used to treat some types of cancer.

Types of cancer treatments

surgery	An operation to remove cancer and/or repair a part of the body affected by cancer.
drug therapies	Drugs that are delivered into the bloodstream so the treatment can travel throughout the body. This is called systemic treatment, and includes: <ul style="list-style-type: none">• chemotherapy – the use of drugs to kill cancer cells or slow their growth• hormone therapy – treatment that blocks the effects 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 – the use of drugs to attack specific features of cancer cells to stop the cancer growing or spreading.
radiation therapy	The use of targeted radiation to kill or damage cancer cells so they cannot grow, multiply or spread. Treatment aims to only affect the part of the body where the radiation is targeted.

Your treatments

Because each person's cancer cells are unique, different people may have different treatments, 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.

Call Cancer Council 13 11 20 for 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. Talk to your treatment team for specific information about radiation therapy for children. They can also provide you with age-appropriate support and resources. You can also check out:

Cancer Australia Children's Cancer – information about types of children's cancer, how they

are treated, and guidance about what to expect once treatment is finished. Visit **childrenscancer.canceraustralia.gov.au**.

Camp Quality – supports children aged 0–13 and their families. Call **1300 662 267** or visit **campquality.org.au**.

CanTeen – supports young people aged 12–25 affected by cancer. Call **1800 226 833** or visit **canteen.org.au**.



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. The radiation is usually in the form of focused x-ray beams. It can also be in other forms such as 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. Treatment is carefully planned to do as little harm as possible to the normal body tissue near the cancer.

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. Although the radiation can also damage healthy cells, most of these cells tend to receive a lower dose and can usually repair themselves. You should not feel any pain or heat during radiation therapy.

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 39–58.

🗨️ You have to lie still during treatment, which can be difficult. I was allowed to bring music and listen to it during treatment. This helped me relax. 🗨️ *Page*

Q: Why have radiation therapy?

A: Research shows that about one in two people with cancer would benefit from radiation therapy.¹ It can be used in three main ways:

As the main treatment to achieve remission or cure –

Radiation therapy may be given as the main treatment with the aim of causing the cancer to disappear. This is called curative or definitive radiation therapy. Sometimes definitive radiation therapy is given with chemotherapy to increase its effectiveness. This is called chemoradiation or chemoradiotherapy (see page 13).

To help other treatments achieve remission or cure –

Radiation therapy is often used before (neoadjuvant) or after (adjuvant) other treatments to make the treatment more effective.

For symptom relief – 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 is radiation therapy given?

A: There are two main ways of giving radiation therapy, 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 20–31.

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 32–38.

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. The large machines used for EBRT (see page 20) are kept in a separate treatment room.

While treatment courses vary, most people have radiation therapy as an outpatient. This means you do not stay in hospital, but travel to the treatment centre for each session. 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: You may have treatment once a day, Monday to Friday, for several weeks, but shorter courses of one to five treatments are also common.

Steps in radiation therapy

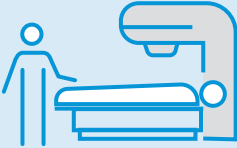
1.



Consultation session

You will meet with a radiation oncologist. They will check your test results and scans, and assess your fitness for radiation therapy. They will explain the treatment process and expected results, as well as possible side effects and risks, so that you can agree (consent) to have radiation therapy.

2.



Planning session

You will meet with the radiation therapy team in the radiation therapy department so they can work out the best position for your body during treatment (EBRT) or where to place the applicators (brachytherapy).

- ▶ Planning for EBRT, see pages 22–23.
- ▶ Planning for brachytherapy, see pages 32–33.

3.



Treatment plan

The radiation oncologist, radiation therapist and radiation physicist will use the information from the planning session to work out the treatment area and how to deliver the right dose of radiation, based on the treatment guidelines for the particular type of cancer. The treatment plan will also include ways to prevent or manage possible side effects.

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 sessions for EBRT, see pages 24–26.
- ▶ Treatment sessions for brachytherapy, see pages 33–36.

5.



Follow-up

You will have regular check-ups with your treatment team to see whether the cancer has responded to treatment and to discuss how to manage any side effects.

Q: How much does treatment 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. How much Medicare pays depends on your treatment plan. Private health insurance does not usually cover outpatient treatments. Ask your provider for a written quote that shows what you will have to pay.

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

A: Many people can continue to work during their treatment and feel well enough to do all their usual activities. Others may need to reduce their hours or take time off. How much 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.

Talk to your employer about your working arrangements. 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, and they can answer your questions about working during treatment. Ask your social worker about any practical or financial assistance available to you.

▶ See our *Cancer, Work & You* booklet.

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 important that you don't become pregnant during the course of treatment. If you suspect you may be pregnant at any stage, it is important to tell your doctor. If you are breastfeeding, talk with your doctor about whether it is safe to continue during your treatment course.

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

What is chemoradiation?

When radiation therapy is combined with chemotherapy, it is known as chemoradiation.

The chemotherapy drugs make the cancer cells more sensitive to radiation therapy. Chemoradiation is used for some cancers, such as head and neck, cervical and oesophageal cancers.

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 course.

Having radiation therapy on the same day as chemotherapy may cause more severe side effects than if you have them separately.

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

How do I prepare for radiation therapy?

The effects of radiation therapy depend on the part of the body being treated, the radiation dose and the number of treatments you need. Your treatment team will tell you the likely effects for you. It can be hard to know how to prepare, but several general issues are worth thinking about in advance.



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 meditation or breathing exercises, or ask the radiation therapists if you can listen to music.

Organise help at home

Some support with housework, meals and errands can ease the load. If you have young children, you may need to arrange for someone to look after them during radiation therapy sessions and possibly afterwards. Older children may need lifts to and from school and activities. Consider asking one friend or family member to coordinate offers of help. You may be able to get practical support through your local Cancer Council.



Find out about quitting

If you smoke, it is important to stop smoking before starting treatment. Smoking may make the treatment less effective and side effects worse. For information and support, talk to your doctor or call the Quitline on **13 7848**.



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 radiation therapy, talk to a member of the radiation therapy team, your GP, or a family member or friend.

Arrange transport

Plan how you will get to radiation therapy sessions. If travelling by car, ask about parking as there will often be spots set aside for radiation therapy patients. At first, you may feel well enough to get yourself to radiation therapy sessions. You are likely to feel more tired as the treatment goes on, so it's best to arrange for someone to drive you. Call Cancer Council **13 11 20** to find out if there is a transport to treatment service in your area.



Mention medical implants

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

Ask about patient travel assistance

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. For details, speak to the hospital social worker or clinic receptionist, or call Cancer Council **13 11 20**.



Consider fertility

Some types of radiation therapy can affect your 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).

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 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.

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. However, they can help you manage any side effects.

After treatment finishes, you will have regular check-ups. Your radiation oncologist will do a physical examination and arrange tests or scans to check whether 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, e.g. pain medicine.

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)
dietitian	recommends an eating plan to follow while you are in 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
physiotherapist, occupational therapist	assist with physical and practical problems, including restoring movement and mobility after treatment, and recommending equipment
lymphoedema practitioner	educates people about lymphoedema prevention and management, and provides treatment if lymphoedema occurs

* *Specialist doctor*



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 – often it won't 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 previous page) 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 tells you that you have cancer, you may not remember everything you are told. Taking notes can help or you might like to ask if you can record the discussion. 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.



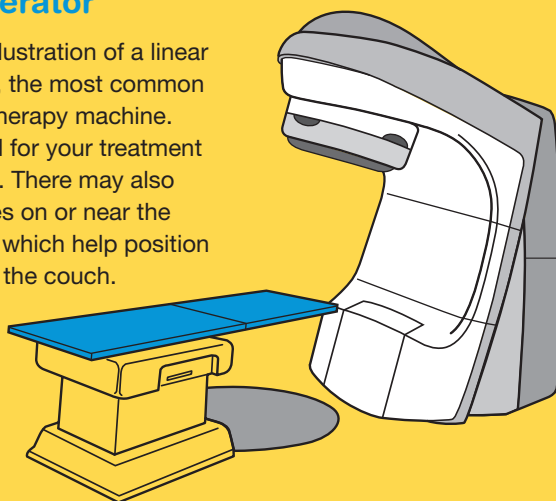
External beam radiation therapy

External beam radiation therapy (EBRT) uses a radiation machine (usually a linear accelerator) to direct high-energy radiation beams at the cancer. The radiation is precisely targeted at the parts of the body with cancer. Treatment is carefully planned to do as little harm as possible to healthy tissues.

You will lie on a treatment table or “couch” under the machine (see illustration below). The machine does not touch you, but it may rotate around you to deliver radiation beams to the area containing the cancer from different directions. This allows the radiation to be more precisely targeted at the cancer and limits the radiation to surrounding normal tissues. You won’t be able to see or feel the radiation. Once the machine is switched off, it no longer gives off radiation.

Linear accelerator

This is a general illustration of a linear accelerator (linac), the most common type of radiation therapy machine. 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

Your radiation oncologist will work out the total dose needed to treat the cancer. In most cases, this will then be divided into several smaller doses called fractions that are given on different days. Each session lasts about 15–25 minutes, with the treatment itself taking only a few minutes (see pages 24–25).

A course of treatment refers to the total number of sessions of radiation therapy you receive. How long you need to have radiation therapy will vary, depending 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 each day, Monday to Friday, for 3–8 weeks. Dividing the total dose into separate treatment sessions with weekend rest breaks allows the healthy cells to recover. Occasionally, the radiation oncologist may recommend two treatments per day, with several hours between the sessions.

If you are having radiation therapy as palliative treatment to relieve symptoms, you may have between one and 10 treatment sessions.

Each fraction of radiation causes a little more damage to cancer cells, so it's important to try to attend all of your scheduled sessions. This helps ensure you receive the amount of radiation needed to eventually kill the cancer cells or relieve symptoms. When you miss sessions, cancer cells have more time to repair the damage, so your radiation therapy may not work as well. Occasionally, treatment breaks are hard to avoid, and you may have extra sessions to make up for the missed sessions.

Planning the EBRT treatment

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



Consultation session

- May take up to two hours.
- Your radiation oncologist will assess whether radiation therapy is the right treatment for you by talking to you, doing a physical examination, and looking at all your tests and scans.
- The radiation oncologist will explain the benefits and side effects of radiation therapy and what to expect during planning and treatment.
- You will also meet the radiation oncology nurse and a radiation therapist. They can provide support and information.
- The radiation oncologist may arrange further x-rays, scans or other tests to find out more about the cancer.
- You may want to take someone with you to keep you company, ask questions and make notes.



CT planning session

- You will need a planning CT scan even if you had a CT scan to diagnose the cancer. This step, known as CT planning or simulation, is usually a few days after the consultation session.
- You will have this scan in the same position you will be placed in for treatment.
- The images will build up a three-dimensional picture of your body. This will show the exact location that needs to receive the radiation.
- The radiation therapists will send the images to a computer. This allows the radiation oncologist to outline exactly the area they need to treat. The oncologist will prescribe the appropriate dose of radiation, which will help the medical physicist and therapists plan the treatment.
- You may have a special CT scan to track your breathing or short breath holds. This may improve treatment accuracy and reduce side effects.



Helping you to keep still

- You will usually need some type of device to ensure you are in the exact same position for each session and to help 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, you may need to wear a plastic immobilisation mask. This will be custom-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 off or if you need to keep them until the full course of treatment is finished. The ink can 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 rather than on your skin.
- For image-guided radiation therapy (see page 28), you may have a small surgical procedure to insert markers (usually gold grains) into or near the cancer. These internal markers can then be seen on scans during the treatment.



The information in this booklet will be relevant in most cases, but you may find that things are done slightly differently where you have treatment. Visit targetingcancer.com.au/radiation-therapy/ebrt to watch a video explaining the radiation therapy process.

What to expect at treatment sessions

You will usually have your first treatment session a few days or weeks after the planning session. There will be at least two radiation therapists at each treatment session. They may ask you to change into a hospital gown and remove any jewellery from the treatment area before taking you into the treatment room. You will be able to leave your belongings in a secure locker. 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.

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 you were in during the planning session. They may move the table or physically move your body. They will check the scans straightaway and make any adjustments needed.

Receiving the treatment

Once you are in the correct position on the treatment table, the radiation therapists will leave and you will be alone in the treatment room. You'll be able to talk to the therapists over an intercom and they will watch you on a television screen. The therapists will operate the machine from a nearby room. The machine will not touch you.

You won't usually see or feel anything unusual, but you may hear a buzzing noise from the machine while it is working and when it moves.

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. If you feel uncomfortable, tell the therapists – they can switch off the machine and start it again when you're ready. 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 may last around 15–25 minutes because of the time it takes the radiation therapists to set up the equipment and put you into the correct position. The first session may take longer while checks are performed. You will be able to go home once the session is over.

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

Managing anxiety

The treatment machines are large and kept in an isolated room. This may be confronting, especially at your first treatment session. You may feel more at ease as you get to know the staff, procedures and other patients. Tell the radiation therapists if you feel anxious or claustrophobic before or during treatment. They can suggest breathing or relaxation exercises, or arrange for you to have a mild sedative.

Discomfort during treatment

EBRT itself is painless – you won't feel it happening. You may feel some discomfort when you're lying on the treatment table, either because of the position you're in or because of pain from the cancer. In this case, talk to the radiation oncology nurse about whether to 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.

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 family, friends, 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.

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 black 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.

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 quite 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.

Techniques and types of EBRT

EBRT can be given using different techniques and different types of radiation. Your treatment centre may not offer all methods, but your radiation oncologist will recommend the most appropriate combination for you.

Three-dimensional conformal radiation therapy (3DCRT)	Intensity-modulated radiation therapy (IMRT)	Image-guided radiation therapy (IGRT)
<ul style="list-style-type: none">• Common type of EBRT.• The radiation therapy team use CT scans to map out the precise location of the cancer and the normal organs that need to be protected.• The radiation beam is then shaped (conformed) so that the cancer receives most of the radiation, and surrounding tissues receive much less.• Used to treat many different types of cancer.	<ul style="list-style-type: none">• Highly accurate type of conformal radiation therapy.• Shapes and divides multiple beams of radiation into tiny beams (beamlets) that vary in dose.• Used for most cancer types, especially for curative treatment.• Volumetric modulated arc therapy (VMAT) and helical tomotherapy (HT) are specialised forms of IMRT that deliver radiation continuously as the treatment machine rotates around the body.	<ul style="list-style-type: none">• Uses a treatment machine that takes x-rays or CT scans at the start of each session to check that you are in the correct position for treatment.• Markers (usually grains of gold) may have been inserted into or near the cancer so they can be seen in the x-rays or scans and used to guide positioning.• Positioning can be very finely adjusted to deliver treatments with millimetres accuracy.• Commonly used with many types of radiation therapy to any area of the body.• May also be recommended for areas likely to be affected by movement, such as the lungs from breathing.



Stereotactic radiosurgery (SRS) and stereotactic radiation therapy (SRT)	Stereotactic body radiation therapy (SBRT)	Proton therapy
<ul style="list-style-type: none">• Specialised type of radiation therapy.• Combines many small radiation fields to give precisely targeted radiation.• SRS is delivered as one high dose and SRT is delivered as a small number of high doses.• Used to treat small cancers in the brain while minimising the radiation reaching healthy brain tissue.• A custom-made mask (see page 23) is worn to keep the head still.• Despite the name, SRS is not surgery and does not involve any surgical cuts.	<ul style="list-style-type: none">• Similar to SRS, this method 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).• Sometimes called stereotactic ablative body radiation therapy (SABR).	<ul style="list-style-type: none">• 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.• Proton therapy is useful when the cancer is near sensitive areas, such as the brainstem or spinal cord, especially in children.• Special machines called cyclotrons and synchrotrons are used to generate and deliver the protons.• Proton therapy is not yet available in Australia (as at November 2019), but there is funding in special cases to allow Australians to travel overseas for treatment.



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 it 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.



Key points about external beam radiation therapy (EBRT)

What it 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 15–25 minutes. The radiation therapy itself takes only a few minutes. Most of the time is spent setting up the equipment and placing you in the correct position. 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 10 sessions.

Safety of EBRT

EBRT does not make you radioactive. The radiation can't be seen or felt.



Brachytherapy

Brachytherapy is the most common type of internal radiation therapy. It is used to treat some types of cancer, including breast, cervical, prostate and uterine. As with external beam radiation therapy, the main treating specialist for brachytherapy is a radiation oncologist (see page 17). 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 external beam radiation therapy, but act over a short distance only. It is a way of giving a high dose of radiation to the cancer with a very low dose to 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 external beam radiation therapy (see pages 20–31).

Planning the treatment


The radiation oncologist will explain the treatment process 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 to 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 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 keep you occupied (see page 35). 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, low-dose-rate or pulsed-dose-rate brachytherapy.

high-dose-rate (HDR)	Uses a single source that release 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 release 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 – 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.

In some cases, the treatment will be high-dose-rate brachytherapy (see box, opposite) and it 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.

In other cases, the radioactive sources will deliver low-dose-rate or pulsed-dose-rate brachytherapy over 1–6 days. During this time, you will be an inpatient and will stay alone in a dedicated treatment room within or close to the main hospital ward.

For low-dose-rate or pulsed-dose-rate brachytherapy, hospital staff will only come into the room for short periods of time, and visitors may be restricted – children under 18 and pregnant women are usually not allowed to enter the room. You can use an intercom to talk with staff and visitors outside the room.

If you have temporary brachytherapy, once the source is removed, you are not radioactive and there is no risk to other people.

Permanent brachytherapy

In permanent low-dose-rate brachytherapy, radioactive seeds about the size of an uncooked 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 – 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 generally 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 for thyroid cancer.

› See our *Understanding Thyroid Cancer* booklet.

Other radionuclide therapies include:

- peptide receptor radionuclide therapy (PPRT), which uses a small amount of a radioactive substance that has been combined with a cell-targeting

protein (peptide). PPRT is used to treat neuroendocrine tumours (NETs) of the bowel, pancreas and lung; and some advanced prostate cancers

- 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 delivers high doses of radiation to cancers in the liver. It uses tiny pellets called microspheres, which contain a radioactive substance. The pellets are injected into a thin tube called a catheter, which is inserted into the main artery (hepatic artery) that supplies blood to the liver.

Radiation from the microspheres 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 required.
- 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 any treatment, the radiation oncologist will consider whether the potential 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 may include fatigue, skin problems, appetite loss, nausea, mouth and throat problems, bladder and bowel problems, hair loss, 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 you have severe side effects, the radiation oncologist may change the treatment 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 condition so it doesn't affect their recovery – see your GP before treatment starts.

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. It can also cause long-term or late effects months or years down the track.

Short-term side effects

Side effects often build up gradually during treatment and it could be a few days or weeks before you notice anything. Often the full impact comes at the end of treatment or even a week or two afterwards.

During treatment, tell your radiation oncology team about any side effects, as side effects can usually be controlled with the right care and medicine. Most side effects are temporary and go away in time, usually within a few weeks of treatment finishing.

“ 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*

Trying complementary therapies

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

Let your radiation oncologist know about any 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.

Long-term or late effects

Radiation therapy can also cause effects months or years after treatment. These late effects are usually mild, they may come and go, and they may not have any major impact on your daily life. However, they may be more significant. Some may go away or improve on their own, while others 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.

Common side effects

The side effects of radiation therapy often relate to the type of cancer and the part of the body treated, so it can be useful to read the booklet about the type of cancer you have. Call **13 11 20** to ask for a free booklet or download a copy from your local Cancer Council website. The table below lists some common side effects of radiation therapy but you are unlikely to experience all of them.

	Short-term side effects	Long-term or late side effects
fatigue	•	
skin problems	•	
appetite loss	•	
nausea	•	
mouth and throat problems	•	
bladder problems	•	•
bowel problems	•	•
hair loss	•	•
lymphoedema	•	•
tissue hardening (fibrosis)		•
sexuality and intimacy issues	•	•
infertility		•

Fatigue

Feeling very tired and lacking energy for day-to-day activities is a 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. It 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.



How to manage fatigue

- Listen to your body. If you feel tired, rest.
- Try to spread activities out through the day.
- 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. Moderate intensity exercise can boost energy levels and make you feel less tired. Talk to your treatment team about suitable activities 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.
- Limit your alcohol intake. If you smoke, try to quit (see page 14).
- Eat a healthy, well-balanced diet, and don't skip meals.

Skin problems

Depending on the part of the body treated, external beam radiation therapy may make skin in the treatment area dry and itchy. Your skin may look red, sunburnt or tanned. Less commonly, it may peel and 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

- Follow the treatment team's instructions about which creams to use and how to look after your skin. Do this once treatment starts, even before you notice any skin changes.
- Check with your treatment team before using any over-the-counter moisturising creams.
- Avoid using razors, hair dryers, hot water bottles, heat packs, wheat bags or icepacks on the treatment area.
- Bathe or shower in lukewarm water, as hot or very cold water can irritate sensitive skin. Do not use harsh soaps or other products. Pat skin dry with a soft towel.
- Let skin markings wear off gradually. Don't scrub your skin to remove them.
- Wear loose, soft cotton clothing. Avoid tight-fitting items, belts, underwire bras, jewellery or collars over the treatment area.
- Cover your skin before going outside and stay out of the sun.
- Avoid chlorinated swimming pools, spas and saunas.

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 sometimes hair loss is permanent.

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. This will make any hair loss easier to manage.
- Wear a wig or toupee, or leave your head bare. Do whatever feels comfortable and gives you the most confidence.
- If you prefer to leave your head bare, wear a hat, beanie, turban or scarf to protect your scalp against sunburn and the cold.
- If you plan to wear a wig, choose it before treatment starts so you can match your own hair colour and style. Call Cancer Council **13 11 20** for information about wig services.
- As your hair grows back, talk to your hairdresser or barber about how to style it. It may be thinner, or curly where it was once straight, and the new growth may be patchy for a while.
- Contact Look Good Feel Better. This program teaches people how to manage the appearance-related side effects caused by cancer treatment. Call **1800 650 960** or visit **lgfb.org.au**.

Appetite loss and nausea

Good nutrition is important during and after cancer treatment. It can help to manage the side effects of treatment and speed up recovery. However, 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 nourishment you need to maintain your weight.

If the radiation therapy is directed near your 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 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.

If you have 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. This will help improve your strength, lessen side effects, and lead to better treatment outcomes.

“ 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 a dietitian for advice on the best eating plan during treatment and recovery.
- If you don't feel like eating solid foods, try enriching your drinks with powdered milk, yoghurt, eggs or honey.
- Do not use nutritional supplements or medicines without your doctor's advice, as some could interfere with 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.

Nausea

- Have a bland snack, such as toast and apple juice, before each session.
 - You may find that food and drinks with ginger or peppermint help to reduce nausea.
 - Sip on water and other fluids throughout the day to prevent dehydration.
 - Eat dry biscuits, crackers or toast.
 - Some people find that anti-nausea medicine helps. Ask your doctor for a prescription. Tell them if the prescribed 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 cancer 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.

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, which outlines any dental work you need before having radiation therapy. It also provides detailed instructions about how to care for your mouth to help prevent tooth decay and deal with side effects such as mouth sores. You will need regular dental check-ups after treatment ends to help prevent future problems.

Dryness and other issues

After several weeks of treatment, your mouth or throat may become dry and sore, and your voice may become hoarse. Radiation therapy can affect your salivary glands so you produce less saliva, which can contribute to a dry mouth. These effects will gradually improve 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.



How to relieve mouth and throat problems

- Have a dental check-up before treatment begins with a dentist who specialises in the effect radiation therapy has on teeth. Your radiation oncologist can provide a referral.
- Keep your mouth moist in between treatments by sucking on ice chips and sipping cool drinks. Carry a bottle of water with you.
- Ask your doctor, nurse or pharmacist for information about artificial saliva to moisten your mouth.
- 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. A dietitian can suggest ways to modify the texture of foods so they are easier to swallow.
- Avoid smoking, drinking alcohol or caffeinated drinks, and consuming citrus or tangy tomato-based food and juice, as they will irritate your mouth and make dryness worse.
- If chewing and swallowing are painful, try to have more liquids or soft food. Talk to a dietitian, who can suggest nourishing foods that will not hurt your mouth, or see our *Nutrition and Cancer* booklet.
- If you have trouble swallowing, ask your doctor for a referral to a speech pathologist.
- To manage taste changes, try different ways of preparing food. For example, add lemon juice to meat and vegetables, marinate foods or add herbs.
- Talk to your doctor if eating is uncomfortable or difficult. If you are in pain, pain medicine may help with swallowing.
- Rinse your mouth regularly using an alcohol-free mouthwash recommended by your doctor or dentist.
- Saltwater is a natural disinfectant – you can make a saltwater mouthwash at home by dissolving $\frac{1}{4}$ teaspoon of salt into 1 cup of warm water. Rinse your mouth with plain water afterwards.

Swallowing and taste 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. Taste changes may last for many months after treatment, but normal taste usually returns eventually. Sometimes, swallowing may be affected for months after treatment and your speech pathologist will monitor you closely to help you recover. Rarely, swallowing problems may be permanent.

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

Bowel problems

To reduce the effects of radiation on the bowel, the radiation therapists may advise you to drink fluids before each session 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. These changes are usually temporary, but for some people they are permanent and can have a significant 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. You will need to go to the toilet more urgently and more often. You may also get abdominal cramping, excess wind and pain. Having diarrhoea can be tiring, so rest as much as possible. 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. This can cause a range of symptoms including blood and mucus in bowel motions; discomfort opening the bowels; or the need to empty the bowels often, perhaps with little result. Talk to your treatment team about your risk of developing radiation proctitis. If you have any ongoing bowel problems, they may refer you to a gastroenterologist.



How to manage bowel problems

- Your doctor may prescribe medicines to relieve symptoms of diarrhoea. 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 so your body gets the energy and nutrients it needs.
- Do some gentle exercise, such as walking, to encourage healthy bowel movements.
- Drink lots of clear liquids when you first notice symptoms of diarrhoea. This helps to avoid dehydration. Try apple juice, weak tea and clear broth.
- If you have diarrhoea, avoid fatty, spicy or fried foods, and rich gravies and sauces. Choose plain foods that are low in insoluble fibre (e.g. bananas, mashed potato, white rice, steamed white fish). Talk to your dietitian about what else you can eat.
- 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 problems

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. Try to drink plenty of water to make your urine less concentrated.

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. 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 and avoid drinking strong coffee, tea and alcohol.



The blood vessels in the bladder and bowel can become more fragile after radiation therapy. This can cause blood to appear in your urine or bowel movements, 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.

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.

Lymphoedema is easier to manage if the condition is treated early. The main signs of lymphoedema include swelling, redness and skin warmth, which may come and go. 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.

“ 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*

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 only 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 sick to want to be intimate. Some people may feel less sexually attractive to their partner because of changes to their 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 treatment 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

Radiation therapy to the pelvis, abdomen and sexual organs can temporarily or permanently affect your ability to have children (fertility). Radiation therapy to the brain can affect 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 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 experience 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 effects on fertility and sexual function, and see our *Sexuality, Intimacy and Cancer* and *Fertility and Cancer* booklets.



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 have a range of impacts, such as pain, lack of flexibility and narrowing of passages (such as the vagina or rectum). Let your treatment team know if you start experiencing any new pain or stiffness, as early treatment can help.

Effects on fertility and sexual function

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.
- The vagina may become shorter and narrower (vaginal stenosis), which may make 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 or a physiotherapist can provide instructions.
- Talk to your doctor about vaginal moisturisers or oestrogen creams, which may help with vaginal discomfort.
- If sexual penetration is painful or difficult, explore different 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 give yourself time to become aroused. Extra lubrication may make intercourse more comfortable.
- Discuss changes to your libido with your partner so they understand how you're feeling.
- Talk to your doctor about ways to manage the symptoms of menopause. If you need more support resuming sexual activity, ask your doctor for a referral to a sexual therapist or psychologist.

Sperm production and erection problems

- Radiation therapy to the pelvic area or near the testicles may temporarily reduce sperm production. You may feel the sensations of orgasm, but ejaculate little or no semen. This is called a dry orgasm. Semen production often returns to normal after a few months.
- Depending on the dose and the area of the pelvis treated, you may have problems getting and maintaining erections, and ejaculation may be painful for a few weeks after treatment. For some men, the difficulty with erections may be permanent.
- Talk to your treatment team if these effects are ongoing and causing you distress. They can suggest ways to manage them, such as prescription medicines, penile implants or vacuum erection devices.

Infertility

- For some men, the effect on sperm production and ability to have erections is permanent and causes infertility. If you want to father 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.
- If your ovaries don't need to be treated, one or both of the ovaries may be surgically moved higher in the abdomen and out of the field of radiation. This is called ovarian transposition or relocation (oophoropexy), 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. Some side effects can take several weeks to get better, others 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. If you would like to have children in the future, talk to your doctor before treatment starts.

Managing side effects

- Your radiation oncology 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 then 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 give you general information about your recovery. They will tell you how to look after the treatment area and recommend ways to manage side effects. They will also suggest 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, as counselling or medication – even for a short time – may help. Some people

can get a Medicare rebate for sessions with a psychologist. Ask your doctor if you are eligible. 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 speech pathologist or dietitian, 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 of any health problems between these follow-up appointments. Many of the long-term or late effects of radiation therapy (see previous chapter) 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 depending on where you live.

Cancer Council 13 11 20

Trained professionals will answer any questions you have about your situation and link you to services in your area (see inside back cover).



Information resources

Cancer Council produces booklets and fact sheets on over 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 (see back cover).

Practical help

Your local Cancer Council can help you find services or offer guidance to manage the practical impact of a cancer diagnosis. This may include access to transport and accommodation services.



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.

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 Australia	canceraustralia.gov.au
Cancer Council Online Community	cancerCouncil.com.au/OC
Optimal Care Pathways	cancerpathways.org.au
<i>The Thing About Cancer</i> podcast	cancerCouncil.com.au/podcasts
Carer Gateway	carergateway.gov.au
Carers Australia	carersaustralia.com.au
Department of Health	health.gov.au
Department of Human Services	humanservices.gov.au
eviQ	eviq.org.au/patients-and-carers
Healthdirect Australia	healthdirect.gov.au
Radiation Oncology: Targeting Cancer	targetingcancer.com.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 both 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 Associations – Carers Australia works with the Carers Associations in each state and territory to provide information and services to carers. Call 1800 242 636 or 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 with or shortly after the main treatment to enhance that treatment's effectiveness.

applicator

Thin plastic tubes (catheters) or cylinders that are 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 in combination with other treatments.

CT scan

Computerised tomography scan. It 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. Also known as definitive treatment.

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.

helical tomotherapy (HT)

A type of highly targeted external beam radiation therapy that uses a machine that rotates around you.

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. IGRT allows positioning to be very finely adjusted.

immobilisation device

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

immunotherapy

Treatment that uses 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)

A machine used to create high-energy x-ray or electron radiation beams for use in external beam radiation therapy.

lymphatic system

A network of vessels, nodes and organs that removes excess fluid from tissues, absorbs fatty acids, transports fat and produces immune cells. Includes the bone marrow, spleen, thymus and lymph nodes.

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; because of chemotherapy, radiation therapy or hormone treatment; or because the ovaries have been removed.

metastasis

Cancer that has spread from a primary cancer to another part of the body. Also called secondary cancer.

neoadjuvant treatment

A treatment given before the main treatment to make that treatment more successful.

nuclear medicine specialist

Coordinates the delivery of radioactive iodine treatment and nuclear scans.

palliative treatment

Treatment, including radiation therapy, that helps people with advanced cancer manage pain and other physical and emotional symptoms.

PET scan

Positron emission tomography scan. A scan in which a person is injected with a small amount of radioactive solution to find cancerous areas and target treatment accurately.

proton therapy

A 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), or stereotactic body radiation therapy (SBRT)

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 that uses imaging scans to help plan treatment. 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.

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. An ultrasound scan can be used to measure the size and position of a cancer.

volumetric modulated arc therapy (VMAT)

A type of external beam 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
- cancersa.org.au/glossary

Reference

1. V Batumalai et al., "Impact of radiotherapy underutilisation measured by survival shortfall, years of potential life lost and disability-adjusted life years lost in New South Wales, Australia", *Radiotherapy and Oncology*, vol. 129, no. 2, 2018, pp. 191–95.



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 cancer nurses 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.

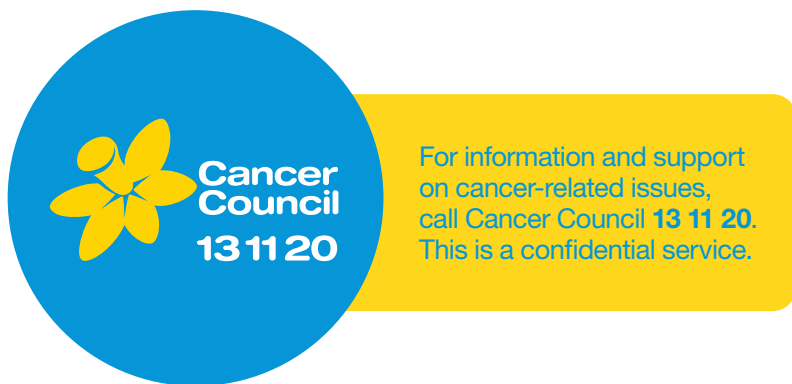
Cancer Council services and programs vary in each area.

13 11 20 is charged at a local call rate throughout Australia (except from mobiles).



If you need information in a language other than English, an interpreting service is available. Call 13 14 50.

If you are deaf, or have a hearing or speech impairment, you can contact us through the National Relay Service. www.relayservice.gov.au



Visit your local Cancer Council website

Cancer Council ACT
actcancer.org

Cancer Council NSW
cancercouncil.com.au

Cancer Council NT
nt.cancer.org.au

Cancer Council Queensland
cancerqld.org.au

Cancer Council SA
cancersa.org.au

Cancer Council Tasmania
cancertas.org.au

Cancer Council Victoria
cancervic.org.au

Cancer Council WA
cancerwa.asn.au

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.*