
Chemotherapy for adults with brain tumours

When you're diagnosed with a brain tumour, there are several ways your healthcare team may provide treatment. One of these is by chemotherapy.

This is the use of cytotoxic (anti-cancer) drugs to destroy tumour cells by disturbing their growth.

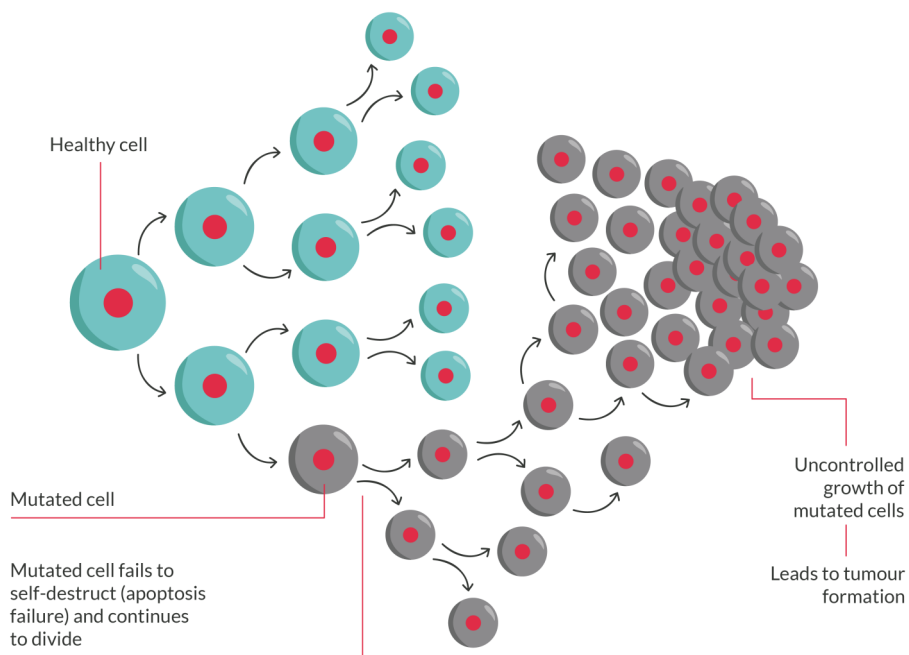
Chemotherapy may be used on its own, or it may be used with or after surgery or radiotherapy.

In this fact sheet:

- ☐ What is chemotherapy?
- ☐ Why is chemotherapy given?
- ☐ How is chemotherapy given?
- ☐ What side-effects might I have?
- ☐ Answers to some commonly asked questions you may have about chemotherapy

What is chemotherapy?

Our bodies are made up of cells, which divide as part of their natural cycle. Tumours occur when cells divide at a faster rate than normal. Chemotherapy is the use of drugs that affect the growth of tumour cells by interfering with the way they divide and create copies of themselves.



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Abnormal cell division, leading to tumour formation

Chemotherapy acts on all dividing cells, including healthy cells. However, healthy cells are able to repair themselves better than tumour cells, so fewer of them die after treatment.

This fact sheet is relevant to chemotherapy in adults. There will be significant differences for children receiving chemotherapy. For more information, see our Chemotherapy for children with brain tumours fact sheet.

Why is chemotherapy given?

Your health team will carefully consider the best course of treatment for you. This will depend on:

- the type of tumour you have and whether it has spread within the brain
- your general health and fitness
- your age.

You should feel free to ask your health team as many questions as you wish.

Chemotherapy may be given:

- during or after surgery to control cells that haven't been removed - this reduces the chance of, or delays, the tumour returning
- with or after radiotherapy, to reduce the risk of tumour regrowth
- to treat a tumour that has returned
- to shrink or control a tumour that cannot be operated on
- to prevent or slow further growth of a tumour.

How is chemotherapy given?

You'll be given chemotherapy in a series of treatments separated by rest periods. A treatment session and rest period is called a 'cycle', and cycles make up the 'course' of treatment.



There are a number of ways chemotherapy can be given:

Tablets

Some chemotherapy drugs can be taken in tablet or capsule form like any other tablet. They're absorbed and carried around your body in the bloodstream to reach the tumour cells.

You'll be able to take the tablets at home, but you should take care not to touch them and should wash your hands straight afterwards. If possible, wear disposable medical gloves when handling the tablets.

You should not crush them to take them, unless you're advised to. There can also be an after-taste to these drugs - chewing flavoured gum afterwards can help to disguise this taste.



As with all medication, tablets should be kept out of the reach of children.

Injection or drip

Chemotherapy drugs can be injected into a vein (intravenously) or into the spinal fluid (intrathecally). When given intravenously, they may be given via a drip to the veins over half an hour to a few hours.

As with tablets, the drugs are absorbed and carried around your body in the bloodstream to reach the tumour cells.



Wafers

Chemotherapy drugs are sometimes put inside a polymer wafer and inserted into the brain during surgery.

Whether this is suitable for your tumour will depend partly on where the tumour is in your brain.

Also, at the moment, the use of these wafers is subject to NICE recommendations. (NICE is the National Institute for Health and Care Excellence.)

As such, they're only licensed for people with high grade gliomas, or with glioblastomas (GBM) that have returned after treatment.

The surgeon must also be confident that at least 90% of the tumour has been removed before they can be used.

For information about brain tumour types, see our *What is a brain tumour?* webpage and fact sheet.

The polymer wafers are made from a biodegradable material. This means they'll break down in the body.

They look a bit like a large white disc, about the size of a two pence piece. They're placed in the brain where the tumour started, after the surgeon has removed 90% or more of the tumour and before the skull is closed up.

The wafer gradually dissolves over 2-3 weeks, releasing the chemotherapy drug directly into the brain. The drug normally used is called carmustine.

The wafers are used to target any cells which couldn't be removed by surgery.

You may also hear them referred to as Gliadel[®] wafers.

Ommaya reservoir / Ventricular access device (VAD)

This is a dome-shaped device that sits underneath the scalp and delivers chemotherapy directly into the cerebrospinal fluid. Also called CSF, this is the clear fluid within the brain and spinal cord.

By doing this, chemotherapy is delivered directly to the brain, which increases its effectiveness.

However, delivering chemotherapy in this way can be complicated and difficult. It doesn't, therefore, form part of routine treatment for most patients.

How long will I have to have chemotherapy?

Individual treatment plans vary and yours will be carefully planned for you specifically. Typically though, a course of treatment may last 6-12 months, consisting of 6-12 cycles. You may have chemotherapy on a few days every few weeks.

You'll usually be scanned every three months during the treatment.

For more information about scans, see our *Scans for adults with brain tumours* webpage and fact sheet.

Do I need to stay in hospital during the chemotherapy?

Chemotherapy is generally given as an outpatient treatment, which means that you don't have to stay in hospital overnight, but in certain circumstances you may need to. A member of your healthcare team will talk to you about this before you start your treatment.

If you're taking tablets, you can take these at home.

If you're having chemotherapy by injection, you would usually have this in a chemotherapy clinic. You may be in the clinic for up to a few hours, as you'll need to have blood tests before the treatment and wait for the results to check it's safe for you to have the injection.

If you have chemotherapy by drip, this will generally happen in the hospital.

What side-effects might I have?

Chemotherapy acts on rapidly or frequently dividing cells. Any cells in the body that divide frequently are therefore vulnerable to chemotherapy. These include skin and hair cells and those lining the digestive system. This is why these parts of the body are often affected by chemotherapy.

Side-effects vary from person to person and from drug to drug. As chemotherapy (temporarily) acts on healthy cells as well as tumour cells though, it may cause some unpleasant short-term side-effects. These commonly include:

Lowered immunity

Chemotherapy can temporarily lower the number of white blood cells in your body. White blood cells play a vital role in fighting infection, so you may be more susceptible to infections during this time.

The most common type of white blood cell is called a neutrophil, so you may hear this called neutropenia.

Your health team will monitor you and give you antibiotics to help fight infection if necessary.

If you have a temperature over 38 degrees or are feeling unwell, always seek advice from your healthcare team.



Increased risk of bleeding/bruising

Some chemotherapy drugs can cause a reduction in the number of platelets in the blood. This is known as thrombocytopenia and is a common occurrence with the chemotherapy drugs temozolomide and PCV.

See the section *Names of chemotherapy drugs* further on in this factsheet.

Platelets are tiny cells that help the blood to clot. This is important in repairing damaged blood vessels, e.g. if you cut yourself. A low platelet count (level) can therefore increase the risk of bleeding.

Signs of a low platelet count include:

- nosebleeds
- bleeding gums
- heavy periods
- bruising
- tiny blood spots in the skin, known as petechiae.

You should tell your healthcare team straight away if you have any of these symptoms.

Platelets can also be lowered by some blood thinning treatments that may be given after surgery. These are given when people are prone to potentially harmful blood clotting, due to their lack of activity. If you're given these, you'll need to be monitored carefully.

Tiredness

Many people who have chemotherapy experience tiredness and low energy (fatigue). This can be frustrating if you've been an active person up until now.



It's important to be patient with yourself and rest as much as you need to.

Balance this with some gentle exercise, such as short walks. Ask friends and family for help around the house to save your energy.

The tiredness will wear off once your course of treatment has finished, but it may take a few months for your energy levels to return to normal.

Anaemia

Anaemia is a relatively common side-effect of chemotherapy. This is because chemotherapy can temporarily lower the number of your red blood cells. These carry oxygen around the body in a substance called haemoglobin (Hb).

Symptoms of anaemia include extreme tiredness, shortness of breath and an irregular heartbeat.

If you have any of these symptoms, tell your healthcare team as soon as possible. You may need to have a blood transfusion to increase the number of red blood cells, or take a medicine that can help your body into producing more red blood cells.

Iron is needed to produce the haemoglobin, which carries the oxygen around the body, so eating a diet high in iron can help to maintain the level of haemoglobin in your blood.

Foods high in iron include dark green leafy vegetables (such as broccoli and watercress), beans, nuts, meat and dried fruits (such as apricots and raisins).

Nausea

Some people may have nausea (feel sick) or actually vomit (be sick) after treatment. Not all chemotherapy drugs cause this and some people experience no sickness at all.

Your healthcare team can give you some anti-sickness tablets if you're affected by nausea, or if the particular chemotherapy drugs you're having are known to cause it.

Hair loss

Not all chemotherapy causes hair loss, it really depends on which drug or combination of drugs you have. Some drugs result in no hair loss at all, or only a very small amount. Most chemotherapy drugs used for brain tumours don't cause complete alopecia (hair loss), but may thin hair.

Generally, any hair loss (thinning) will start within a few weeks of treatment beginning.

Once treatment has finished, hair should begin to grow back over the next few months, but it may be different to how it was previously, e.g. a different texture or colour.

However, if you're also having radiotherapy, this may be the main cause of your hair loss, rather than the chemotherapy. As such, the loss in the areas affected by the radiotherapy beam may be more permanent.

For more information, see our *Radiotherapy for adults with brain tumours* webpage and fact sheet.

For information about where to find wigs or headwear, please see the Resources section further on in this fact sheet.

Sore mouth (oral mucositis)

Oral mucositis (inflammation of the inside of the mouth) is a possible side-effect of chemotherapy that's more likely with high doses.

Some people say it feels like burning your mouth from eating or drinking something too hot.

Symptoms of mucositis usually begin 7-10 days after you start chemotherapy, but will usually clear up on their own within a few weeks after treatment has ended.

If you experience oral mucositis, you may also suffer from ulcers in your mouth or on your tongue and lips.

This can be very unpleasant. It's possible for ulcers to bleed and become infected, particularly as your immunity may also be lowered from the chemotherapy. This can make it difficult to eat, drink and talk.



Sucking on ice cubes or ice lollies can help to relieve discomfort, and there are a number of medicines which can relieve the symptoms.

It's also common to get oral thrush related to the treatment and to steroids. This usually appears as a white or discoloured coating on your tongue and the insides of your cheeks, and food often seems to taste differently.

If this occurs, or you're concerned about oral mucositis, it's important to seek medical advice from your healthcare team.

Taste, appetite and digestion

Sometimes, chemotherapy causes changes to taste and appetite. It can also cause diarrhoea or constipation.

It's important to try and eat healthily and drink plenty of fluids, even if you don't feel like it, particularly if you have diarrhoea. Try small, more frequent meals and sipping drinks through a straw.

Speak to your healthcare team, who can recommend suitable medicines to help relieve the symptoms.

Effects on skin and nails

It's possible that your skin may become dry and sore, particularly on your hands and feet. Your nails may also become dry and brittle.

Some chemotherapy drugs can cause your skin to become more sensitive to sunlight (and to chlorine), both during chemotherapy and for some time afterwards.

So it's important to make sure that your skin is protected from the sun. You should :

- use a sunscreen that blocks both UVA and UVB rays, at least SPF (sun protection factor) 30-50
- keep covered up
- avoid going out in the sun in the hottest part of the day (10am-4pm)

Numbness or tingling hands or feet

This is caused by the chemotherapy drug affecting the nerves and is called peripheral neuropathy. You may also find fiddly tasks, such as fastening buttons, difficult.

Occasionally this effect can be permanent. Let your healthcare team know if you get these symptoms - they may need to lower the dose.

Reaction with alcohol and foods

Some chemotherapy drugs, such as procarbazine, can react with alcohol (and non-alcoholic beers and wine), causing sickness, dizziness or breathlessness.

When you're taking these drugs, and for about 2 weeks afterwards, it's best to avoid these types of drink.

Some chemotherapy medication, particularly procarbazine, can cause an allergic reaction rash when taken with alcohol or some foods. You should avoid foods such as mature cheeses, salami, and yeast or beef extracts (Oxo[®], Bovril[®] and Marmite[®]).

This reaction can occur while you're taking the tablets or after you've stopped taking them.



If you get a reaction, it's important that you stop taking the tablets and contact your healthcare team.

Less common side-effects

Less common side-effects can occur that affect other organs, such as the lungs, liver or kidneys.

Some of these cause symptoms, but others can only be detected by blood tests, which you'll have during your treatment. Your oncologist will go through these possibilities with you.

Side-effects tend to gradually disappear over time once the treatment is complete, but if you're concerned about any of your side-effects, please remember to speak to your healthcare team.

What happens after treatment has finished?

You'll have check-up appointments following treatment, which will sometimes include scans. These appointments may continue for a number of years after your chemotherapy has finished.

How will I know if chemotherapy has worked?

At the end of treatment, or sometimes throughout the process, you'll be monitored for any changes to the tumour. This can be through the use of scans (Magnetic Resonance Imaging or MRI and Computerised Tomography or CT), to see whether the tumour has stabilised or is shrinking.

For more information, see the *Scans for adults with brain tumours* webpage and fact sheet.

Why are treatment periods followed by rest periods?

Rest periods between treatment sessions allow your body to recover from any side-effects and give healthy cells a chance to repair themselves.

Having chemotherapy in a series of cycles also enhances its effectiveness. This is because chemotherapy only destroys cells that are in the process of dividing.

Tumour cells are not dividing all the time, so there'll be times when they're resting.

The first time you have chemotherapy, it won't work on the cells that are resting. During the second treatment session, the cells that were resting the first time may now be dividing, increasing the chance that the chemotherapy will affect them.

Is there a maximum number of times I can have chemotherapy?

This depends on the type of chemotherapy drug. With each dose of a drug, there can be increased side-effects that affect the body's functions. This is called cumulative toxicity. A limit is therefore set to prevent these side-effects becoming too severe.

You may be stopped from having other chemotherapy drugs either because they're not working, or an individual unacceptable toxicity (level of harmfulness) occurs, or you can no longer tolerate the drug.

These effects may be picked up by the results of blood tests, not by how you're feeling.

Names of common chemotherapy drugs

There are around 50 different types of chemotherapy drug. Names of common chemotherapy drugs used to treat primary brain tumours include:

- lomustine (CCNU)
- procarbazine
- carmustine (Gliadel[®])
- vincristine
- temozolomide (Temodal[®]).

You may be given just one, or you may have a mixture - this is called combination therapy. The most common combination of drugs used to treat brain tumours is known as PCV. It's a combination of procarbazine, lomustine (CCNU) and vincristine.

What are chemotherapy drugs made from?

There are many different types of chemotherapy drugs, which are made from different sources and work in slightly different ways to destroy tumour cells. Drugs are made in a laboratory, but many of them are derived from natural plant extracts.

Resources

Wigs and other headwear

There are many different styles of wig to choose from, including synthetic (monofibre) and human hair wigs. You can also buy headscarves and other headwear.

You can get free synthetic wigs on the NHS if:

- you live in Scotland, Wales or Northern Ireland (via free prescriptions)
- you live in England and:
 - ◇ you're under 16, or under 19 and in full-time education
 - ◇ you're a hospital inpatient
 - ◇ your weekly income is low
 - ◇ you apply to the NHS Low Income Scheme and receive an HC2 certificate for full help with health costs
 - ◇ you have a valid NHS tax exemption certificate
 - ◇ you're a war pensioner, the wig is for your accepted disablement and you have a valid war pension exemption certificate.

People in England who are receiving treatment for cancer, the effects of cancer, or the effects of current or previous cancer treatment now get free prescriptions. This includes a prescription for a synthetic wig.

Disclaimer: The Brain Tumour Charity provides the details of other organisations for information only. Inclusion in this fact sheet doesn't constitute a recommendation or endorsement. The following list is not exhaustive.

Afrostyling

This is an online retailer selling wigs, extensions and other hairpieces.
afrostyling.com or 0161 870 2387

Annabandana

Selection of headwear that can be ordered online or by phone.
annabandana.co.uk or 01297 553747

Bohemia Fashions

Headwear for men, women and children with hair loss, including sleep caps and padded headscarves.
bohemiaheadwear.co.uk or 01582 750083

Chemotherapy Headwear

Sells hats and headscarves for people experiencing hair loss.
chemotherapyheadwear.com or 01483 901403

Direct Wigs

Online seller of both men and women's wigs, hair pieces and scarves.
directwigs.co.uk or 01793 632152

Hairware

Large selection of wigs, hats and other accessories. Approved by the NHS for prescription wigs.
hairware.com or 0845 713017

My New Hair

Charity that provides support and advice for medical hair loss, plus a network of salons providing wig styling.

mynewhair.org

Little Princess Trust

Provides free real-hair wigs to young adults (male and female) up to the age of 24, who have lost their own hair through cancer treatment.

littleprincesses.org.uk or 01432 760060

Hero by LPT

Part of the Little Princess Trust, this service was set up in response to some boys not being comfortable receiving a wig from a charity called Little Princess Trust. It provides free real-hair wigs to boys and young men up to the age of 24, who have lost their hair through treatment for cancer.

herobylpt.org.uk or 01432 760060

Hair4U

Offers free real-hair wigs and a salon styling experience for young people aged 13-24 (male and female) nationwide. Set up by Teenage Cancer Trust.

teenagecancertrust.org/about-us/what-we-do/hair4u

or 0207 612 0370

WigBank

A network of wig banks around the UK that offer new and donated wigs for sale. People donate wigs they no longer need. The wigs are washed, disinfected, conditioned and sold from £20, with £5 going to a cancer charity of the buyer's choice.

wigbank.com or 0131 336 5100

Wig-Wham

Provides a personal service for women to try on wigs in her private studio. Can offer evening and weekend appointments.

wig-wham.co.uk or 01785 823531

The Institute of Trichologists

Gives information about hair grafts.

trichologists.org.uk or 0845 604 4657

What if I have further questions or need other support?

You can contact our Information and Support Team in the following ways:



0808 800 0004

(Free from landlines and most mobiles:
3, O2, EE, Virgin and Vodafone)



support@thebraintumourcharity.org



Live Chat

Get in touch with us online via
thebraintumourcharity.org/live-chat



Join one (or more) of our
closed Facebook groups:
bit.ly/FBSupportGroups



thebraintumourcharity.org/getsupport

**Want to make a difference
through your diagnosis?**

**BRIAN can help. Sign up at:
thebraintumourcharity.org/BRIAN**

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About this information resource

The Brain Tumour Charity is proud to have been certified as a provider of high quality health and social care information by The Information Standard - an NHS standard that allows the public to identify reliable and trustworthy sources of information.

Written and edited by our Information and Support Team, the accuracy of medical information in this resource has been verified by leading health professionals specialising in neuro-oncology.

Our information resources have been produced with the assistance of patient and carer representatives and up-to-date, reliable sources of evidence.

We hope that this information will complement the medical advice you've already been given. Please do continue to talk to your medical team if you're worried about any medical issues.

If you'd like a list of references for any of our information resources, or would like more information about how we produce them, please contact us.

We welcome your comments on this information resource, so we can improve. Please give us your feedback via our Information and Support Team on **0808 800 0004** or
support@thebraintumourcharity.org

About The Brain Tumour Charity

The Brain Tumour Charity is at the forefront of the fight to defeat brain tumours and is the only national charity making a difference every day to the lives of people with a brain tumour and their families. We fund pioneering research worldwide, raise awareness of the symptoms and effects of brain tumours and provide support for everyone affected to improve quality of life.

We wouldn't be able to make the progress we have without the incredible input we receive from you, our community.

Whether it's reviewing our information resources, campaigning for change, reviewing research proposals or attending cheque presentations, everything you do helps to make a difference.

To find out more about the different ways you can get involved, please visit thebraintumourcharity.org/volunteering

We rely 100% on charitable donations to fund our work.

If you would like to make a donation, or find out more about other ways to support us, including leaving a gift in your Will or fundraising through an event, please get in touch:

Visit

thebraintumourcharity.org/get-involved

call us on 01252 749043 or email

fundraising@thebraintumourcharity.org



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