Neurosurgery for brain tumoursA red line under the title of this fact sheet.

Having surgery means having an operation using equipment to manually examine or treat a disease. Neurosurgery is surgery performed on the brain or spinal cord and is conducted by a highly specialised health professional called a neurosurgeon. For brain tumours, surgery can have several purposes, including diagnosis, whole or partial removal of the tumour, insertion of [chemotherapy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C) drugs directly into the brain, or reduction of symptoms such as [hydrocephalus](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_H) (a build up of cerebrospinal fluid, increasing pressure in the skull).

This fact sheet gives an overview of some of the different uses of surgery  
for brain tumours and answers some questions you may have about   
brain surgery.

# In this fact sheet:

* Biopsy
* Craniotomy
* Insertion of chemotherapy into the brain
* Shunts
* Answers to some common questions you may have about neurosurgery

## Biopsy

A [biopsy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_B) is a small sample of tumour tissue taken from a site of disease which is then analysed under a microscope by a neuropathologist (*for further information see the multidisciplinary team fact sheet*). A biopsy is often used to help give an exact diagnosis of the type of tumour you have. This helps your health team to decide on the best course of treatment for you. Biopsies may also be used to identify your suitability for certain clinical trials.

### The biopsy procedure:

* You will first have an [MRI](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_M) scan or [CT](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C) scan (*for further information see the scans fact sheet*). The purpose of the scan is to show exactly where in the brain the tumour is. The surgeon will put the scan image into a computer, which will then help guide them as to which route into the tumour is best. This technique is called ‘Stereotactic’ or ‘image guided’ biopsy.
* After the scan, you will be given a general anaesthetic before your neurosurgeon drills a small hole called a ‘burr hole’ into your skull. Although this may sound frightening, you will not be able to feel anything because of the anaesthetic.
* The neurosurgeon will then pass a needle through the burr hole and take a small sample of the tumour. The sample that they remove is sent to a laboratory to be analysed by a pathologist who will give a diagnosis of the exact tumour type you have.
* A biopsy usually takes around 2 to 3 hours, including the time it takes for you to have an anaesthetic.

## Craniotomy

‘[Craniotomy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C)’ literally translates as ‘making a hole in the skull’ and is a medical procedure that has been carried out for hundreds of years in basic forms. The purpose of a craniotomy is to allow the neurosurgeon access to your brain. It is the most common type of surgery for brain tumour patients and it is used to remove all or part of the tumour (partial removal is known as debulking). A craniotomy can be performed when you are awake (known as an ‘awake craniotomy’) or when you are asleep. Even if you are awake, you will be put to sleep for the first part of the procedure, when an incision (cut) is made in your scalp.

### The craniotomy procedure:

* You will be given an anaesthetic to the part of your scalp that the neurosurgeon will need to cut in to.
* Once the anaesthetic takes effect, an incision (cut) is made in your scalp. It may be necessary to have a small area of your hair shaved to allow access and for hygiene reasons.
* After the skin has been cut your neurosurgeon will proceed to remove   
  a section of your skull. This is called a ‘bone flap’ and it allows the neurosurgeon to reach your brain.
* If you are having an awake craniotomy, you will be woken at this point. This is to allow your neurosurgeon to check that your brain is functioning correctly, for example, by asking you to read something.
* After your neurosurgeon has accessed your brain they will remove all or part of the tumour. Very often, it is not possible to safely remove the whole tumour. This will depend on where in the brain the tumour is and how close it is to vital areas. In such cases the neurosurgeon will remove as much as possible. Partial removal is known as ‘debulking’ or ‘partial resection’ and even though this does not remove all of the tumour, it can help reduce symptoms caused by pressure from the tumour. It may also make the remaining tumour cells more responsive to other treatments such as [chemotherapy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C) and [radiotherapy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_R) (*for further information see the chemotherapy and radiotherapy fact sheets*).
* Once the surgery is complete, your neurosurgeon will replace the bone flap and seal the wound using stitches or metal clips. These will usually be removed a week or two after surgery. If you have dissolvable stitches there will be no need for them to be removed.
* The length of time a craniotomy takes depends on the part of the brain being operated on. As a very general guide, neurosurgery may take around 4-6 hours.

## Insertion of chemotherapy drugs directly to the brain

Following a craniotomy you may have chemotherapy drugs inserted directly to the brain. Some chemotherapy drugs are not able to cross the blood-brain barrier (*for further information see the human brain fact sheet*) but insertion during surgery allows them to do so.

A further advantage of having chemotherapy in this way is that the dose can be more concentrated and effective.

The types of ways in which you may have chemotherapy drugs delivered directly into the brain are:

### Wafer implants

After whole or partial removal of the tumour, the neurosurgeon may place chemotherapy wafer implants into the space where the tumour was. The wafers gradually dissolve over the next couple of weeks, releasing chemotherapy as they do so. The purpose of wafer implants is to rid any remaining tumour cells at the site of surgery. You may also hear these implants referred to as Gliadal wafers.

### An [Ommaya reservoir](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_O)

This is a dome-shaped device that sits underneath the scalp and delivers chemotherapy directly into the cerebrospinal fluid ([CSF](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C)),the clear fluid within the brain and spinal cord. By doing this, chemotherapy is delivered directly to the brain, which increases its effectiveness.

## Shunts

Another reason you may have surgery is to have a [shunt](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_S) fitted. A shunt is drainage tube that helps to reduce pressure and headaches, which are common symptoms of brain tumours. These symptoms can occur because of a build up of cerebrospinal fluid (CSF) in the brain if the tumour is blocking its circulation. As the CSF builds up in one area, pressure rises causing headaches. A build-up of CSF is known as [hydrocephalus](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_H) (sometimes called ‘water on the brain’).

To reduce this pressure, neurosurgeons can insert a tube called a ‘shunt’ into your skull to drain some of the excess fluid away. The shunt has valves to ensure that it takes fluid in the correct direction, away from the brain and towards other parts of the body that can easily absorb it, such as the   
stomach lining.

A shunt is not a cure for a brain tumour, but it can help to improve symptoms related to increased pressure in your skull.

The length of time a shunt stays in for varies. If you need to have a shunt for a long period of time, you will have regular check-ups to ensure that it is still working as it should do and that it has not become infected. You cannot see a shunt from outside the body, so other people will not know that it is there unless you tell them, however, you may be able to feel your shunt running down behind your ear. You may have a ‘programmed shunt’. This only allows fluid to drain when pressure becomes too high. If you have this type of shunt fitted, it is important to know the settings. After each MRI scan the programmed shunt will need to be re-set because of the effect of the magnet on the shunt setting.

## Where will I wake up after surgery?

Following surgery, you are likely to wake up in either an intensive care unit ([ICU](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_I)) or a high dependency unit (HDU). While you are in here, you will have one to one personal care and attention. You may also be linked to a machine that controls your breathing (a ventilator) to give your brain a chance to recover. The amount of time it takes to wake up after surgery varies. Many people wake up very soon afterwards but some people remain unconscious for a number of hours or a few days.

## Why are there tubes in my body after surgery?

When you wake up after surgery, you will have a number of tubes coming   
in and out of your body. This unfamiliar experience can be upsetting, particularly if you do not know what the tubes are for. You may be linked to the following devices:

* **Drips**. These are tubes that give you water and nutrients until you are able to eat normally. They may also deliver medicines in to your blood stream.
* **External ventricular drain (EVD)** This drains fluid from the brain   
  to prevent the build up of cerebrospinal fluid (CSF), which can   
  cause hydrocephalus.
* **Tubes from your wound** that drain excess blood and fluid.
* **An intracranial pressure (**[**ICP**](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_I)**) monitor**, which monitors the pressure in your brain.
* **A urinary** [**catheter**](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C). This goes into your bladder and gives a measure of how much urine you are producing. It is used to monitor whether you have an appropriate amount of fluid in your body and also drains urine.
* **A** [**nasogastric tube**](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_N). This tube goes down through your nose to your stomach and provides liquid food.
* **Blood pressure monitors**

## How will I feel after surgery?

Many factors will influence how you feel after surgery, including the type of surgery you have had, and the size and location of your tumour. When you first wake up after brain surgery, you may have swelling and bruising on your face. It is not unusual to feel some temporary worsening of the symptoms you had before the surgery.

You may also experience some or all of the following temporary effects:

* Headaches caused by swelling in your brain. The swelling should die   
  down within a couple of days and painkillers can be used to help relieve the headaches.
* Momentary phases of feeling dizzy or confused.
* Difficulty swallowing. You may have your swallowing checked by a speech therapist before you are allowed to eat or drink anything.
* New symptoms, which might include personality changes, poor balance and co-ordination, speech problems, weakness and epileptic   
  seizures (fits).

The above list may be overwhelming, but it is important to remember that such effects usually disappear fairly soon after surgery and that a team of health professionals will be taking care of you. Before surgery, your consultant will discuss with you what to expect. You should not feel awkward about asking as many questions as you would like to.

## Will I have a dressing on my wound?

When you wake up after surgery, you will have a dressing or bandage on your wound. Usually, this stays on for around five days after surgery.

## Will my hair grow back?

If you have had an area of your hair shaved before surgery, it normally grows back relatively quickly.

## How long will it be after surgery before I am back on my feet?

Neurosurgery is a major operation and you will need to rest for a number of days afterwards. For the first few days, one of the top priorities for your health team will be ensuring that the pressure in your head does not increase. Nurses will help to ensure this by checking that you are lying in a suitable position. They will also ensure that you are moving your arms and legs around enough to allow blood flow and to prevent thrombosis (blood clots) or your muscles from stiffening up.

## How will I know if the surgery has been successful?

You are likely to have a brain scan a few days after surgery. This will give your health team a good idea whether any of the tumour remains and how much swelling of the brain you have. The success of surgery is measured on what the aim of the surgery was and not on curing a tumour. Even if all of the visible tumour is removed, this does not necessarily mean that all of it has gone, although it may have.

## Will surgery cure my tumour?

Before surgery, your consultant will discuss with you what to expect from surgery and whether they are hoping to remove all, or part of, the tumour.

Often, surgery does not cure a tumour completely, but removing part of it can make any remaining tumour cells more responsive to other treatments, such as radiotherapy and chemotherapy.

## I’ve had brain surgery – what’s next?

Your consultant should talk through your treatment plan with you so that you know what to expect. Often, after brain surgery, you would have another treatment, such as chemotherapy or radiotherapy, to rid any remaining tumour cells.

Due to the swelling in the brain after surgery, it is common to be given [steroids](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_S). You may be prescribed a type of steroid called ‘Dexamethasone’. Steroids help to reduce the swelling and increased pressure in your head. Under the guidance of your consultant, you will gradually be able to stop taking steroids. (*For further information see steroids fact sheet*)

Some people experience [seizures](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_S) (or ‘fits’) after brain surgery due to increased pressure in the head. You may be given anti-epileptic medication as a preventative measure. The length of time people take this for varies from person to person, but it is not uncommon to take anti-epileptics for up to a year after brain surgery.

## Are there any long-term difficulties associated with surgery?

Before you have surgery, a health professional from your medical team will talk you through what to expect. You should feel free to ask them as many questions as you wish at any point.

Long-term difficulties after surgery are possible, but the nature of these   
will depend on which part of the brain has been operated on. Such difficulties could include problems with speech and movement or problems with   
thought processes.

If this happens to you, professionals such as speech and language therapists, physiotherapists and clinical psychologists will work with you to improve these difficulties. Do not be afraid to ask for such support if you feel it is necessary. (*For further information see the cognition and brain tumours and communication difficulties and brain tumours fact sheets)*

## Will I be able to fly after brain surgery?

If you wish to travel by plane after brain surgery, you should seek advice from your doctor. Normally, you would not be able to fly for a little while after neurosurgery. As a rough guide, you may be asked to wait six weeks after having a [craniotomy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_C) and four weeks after a [biopsy](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_B) before flying. After this period it should be safe to fly.

The reason for the wait is to do with changes in air pressure and oxygen levels when you travel by plane. Any air remaining within the brain after surgery may expand with the lower air pressure when in-flight and some patients have been known to deteriorate as a result.

Travel insurance may also be more expensive or difficult to obtain following neurosurgery. It is essential that you ensure you are fully covered to travel before you do so to prevent incurring heavy costs if you fall ill when away. There are some specialist insurers who may insure you to travel (*for further information, see the travelling and brain tumours fact sheet*).

## Will I be able to play sport after brain surgery?

If you wish to play sport after your surgery, seek advice from your doctor. Once you have recovered from surgery, there should be no problem with you playing sport, though you should avoid sports that involve significant physical contact between players (‘contact sports’) such as rugby and wrestling. Your doctor will be able to advise you on when you can begin playing sport again after brain surgery.

## Will my wound become infected?

Although infection is a possibility, it is very uncommon. Your health team will check your wound after surgery and give you advice on preventing infection. They may also give you [antibiotics](http://www.thebraintumourcharity.org/NR/exeres/05EFEFD0-1D42-4972-BF9A-3F7FB7C3012F,frameless.htm?NRMODE=Published#MainControl_Glossary_ZoneMain_GlossaryPlaceholderControl1_ctl00_PresentationModeControlsContainer_SECTION_A) to prevent infection.

## What if I am told I can’t have surgery?

If your consultant does not think surgery is appropriate for you, you may   
like to ask them to talk you through their decision to explain it to you. If you are still unhappy with their decision, you could ask for a second opinion from another consultant. Your current consultant or your GP can help to   
arrange this.

# What if I have further questions?

If you require further information, any clarification of information, or wish to discuss any concerns, please contact our Support and Information Team.

* Call 0808 800 0004 (free from landlines and most mobiles including 3, O2, Orange, T-mobile, EE, Virgin and Vodafone)
* Email [support@thebraintumourcharity.org](mailto:support@thebraintumourcharity.org)
* Join our online forums at [www.thebraintumourcharity.org/forums](http://www.thebraintumourcharity.org/forums)

# About us

The Brain Tumour Charity makes every effort to ensure that we provide accurate, up-to-date and unbiased facts about brain tumours. We hope that these will add to the medical advice you have already been given.

Please do continue to talk to your doctor if you are worried about any medical issues. We are the UK’s leading brain tumour charity. We fund scientific and clinical research into brain tumours and offer information and support to those affected, whilst raising awareness and influencing policy.

We rely 100% on charitable donations to fund our vital work. If you would   
like to make a donation, or want to find out about other ways to support us including fundraising, leaving a gift in your will or giving in memory, please visit us at [www.thebraintumourcharity.org](http://www.thebraintumourcharity.org) or call 01252 749043.

# About this fact sheet

This fact sheet has been written and edited by The Brain Tumour Charity’s Support and Information Team. The accuracy of medical information has been verified by a leading neuro-oncologist. Our fact sheets have been produced with the assistance of patient and carer representatives and up-to-date, reliable sources of evidence. If you would like a list of references for any of the fact sheets, or would like more information about how we produce them, please contact us.

# Neurosurgery for brain tumours

# Your notes



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