

Gamma Knife Radiosurgery

A Patient's Guide



Bupa Cromwell Hospital
Gamma Knife Centre



Statement of purpose

The Bupa Cromwell Hospital Gamma Knife Centre aims to provide the best possible care for all patients undergoing Stereotactic Radiosurgery. We aim to offer a service that is caring, professional and safe for patients as well as staff. The service is based on standards set by the relevant professional organisations (for example the Royal College of Surgeons, Royal College of Radiologists and the Society of Radiographers).

The Department is open routinely from **09.00 - 17:30 on Monday to Friday.**

The Department offers the following services:

**Stereotactic Radiosurgery
Stereotactic Biopsies
Specialist Consultations**

The Gamma Knife Co-Directors are:

**Mr Christer Lindquist and
Professor Bodo Lippitz**

The Gamma Knife Manager is:

Ms Renay Joss

The Chief Physicist is:

Mr David Nicholas

The Department is staffed by:

**1 Medical Director
2 Radiographers
2 Administrative Staff**

The Department has the services of:

**9 Neurosurgeons
4 Clinical Oncologists
2 Consultant Physicists
3 Neuroradiologists**

If you have any questions or concerns on the services of the Centre please contact:

Renay Joss, Gamma Knife Manager:	020 7460 5949
Alba Martinez, Gamma Knife Co-ordinator:	020 7460 5935
Lauren Norkett, Gamma Knife Secretary:	020 7460 5938

Alternatively you may contact the Complaints and Claims Department at Bupa Cromwell Hospital, telephone 020 7460 5735 or The National Care Standards Commission at 11 Floor, 26-28 Hammersmith Grove, London W6 7SE, telephone 020 8735 6373.

Introduction

Welcome to Bupa Cromwell Hospital's Gamma Knife Centre, London's first Gamma Knife treatment facility.

Opened in July 1998, the Centre was custom-designed to house the Model B Gamma Knife, patient preparation, planning rooms and a family waiting area. In January 2007 the Model B Gamma Knife was replaced with the state of the art Gamma Knife® Perfexion™, the first commercial unit in the world. Currently there are only three Gamma Knife units in the whole of the United Kingdom. In addition to patient treatment, the Centre also offers continuing education and research opportunities for physicians.

This patient guide has been designed to explain in detail the treatment process you will experience whilst undergoing Gamma Knife Radiosurgery at Bupa Cromwell Hospital. We hope that you will find it helpful. Should you have any more questions our staff and/or doctors will be happy to discuss these with you.

Gamma Knife Treatment at Bupa Cromwell Hospital

This technique, which was first developed in Sweden in 1967, is one of the most modern types of treatment for abnormalities within the skull. It involves the use of complicated computer technology but does not require surgical incision.

The Gamma Knife Centre at Bupa Cromwell Hospital is under the direction of one of the most experienced Gamma Knife Surgeons in the world and a team of highly qualified and experienced Neurosurgeons, Neuroradiologists, Medical Physicists, Radiotherapists, Clinical Oncologists and other professionals including Therapy Radiographers. The team is available to offer individual care to each patient and provide a first class service.

Treatment with Leksell Gamma Knife

Treatment with the Leksell Gamma Knife (or stereotactic radiosurgery) is a method by which the patient is irradiated with great precision using focused gamma rays. The treatment is non-invasive (performed without cutting of the skin or muscles and without opening the skull). This method is therefore safer and excludes the risk of infection associated with typical surgical operations.

The radiation unit consists of 192 Cobalt-60 sources arranged in 8 sectors embedded within the shielded radiation unit. The narrow beams coming from these sources intersect at the target. Our goal is to ensure that the focal area to be treated is always precisely located at the point of intersection, leaving the surrounding tissues with a low dose and minimal swelling.

To achieve this precision a special frame is attached to the skull and this in turn is fixed very precisely into the positioning system on the treatment couch. This frame stays on for the whole treatment process.

What will happen?

On arrival for admission, the night before or on the morning of your treatment, please report to the Main Reception Desk. Our staff from the Inpatient Accounts Department will greet you and check your registration and payment details.

Once the admission process has been completed you will be escorted to your room where you will be able to rest and relax whenever you are not being scanned or treated. Specially trained nurses will be on hand should you need them. Friends and relatives are very welcome to visit you at any time up until 10 pm.

The Consultant who is responsible for your care may come to see you.

What to bring?

It is best to bring toiletries for two to three days just in case your stay is longer than usual. You may wish to bring your own dressing gown. During your treatment you may wish to bring a CD with your choice of music that can be played for you.

What about friends/relatives?

Your friends and relatives are welcome to stay in the room during the day and wait for you to return in between the preparation and treatment stages. We would ask however that only one relative accompanies you into the Unit due to space restriction. We have coffee facilities on the lower ground floor, which are available for patients and relatives and also offers a selection of sandwiches, cakes and beverages. If you and your relatives are travelling a considerable distance we can provide a list of affordable accommodation near the Hospital.

1. The Morning - Preparation for treatment.

- You will be asked to shampoo your hair or you may wash your hair the night before if you have an early morning admission (please do not use any hair styling products such as gel or hairspray)
- Please ensure all eye make-up is removed
- You may be asked to fast for 4 hours prior to the frame fitting procedure
- A tablet, intramuscular or intravenous pre-treatment medication may be administered to help you relax
- You will need to put on your Hospital gown and remove all metallic objects including under-garments with metal hooks/clips/pins etc

You will be brought down in a chair or bed to the Gamma Knife Centre where one of our Gamma Knife Radiographers, who will remain with you throughout the day, will explain the entire Gamma Knife procedure and answer any questions you may have.

Once in the preparation room of the Gamma Knife Centre, the head is cleaned with alcohol and a local anaesthetic is injected at four sites on the head where the stereotactic frame will be fixed to the external table of the skull using four screws. (see Fig 1 below). No shaving of the hair will be necessary. During this process you may experience some pain with the injection of local anaesthetic, and there may be a sensation of increased pressure in the head as the frame goes on, but this will subside. This process should take approximately 15 minutes and the frame will stay attached to your head for the whole treatment time. You will then proceed to the imaging stage of planning your treatment.



Fig 1. The Frame Fitting Procedure

2. Planning your treatment - Stage One

Magnetic Resonance Imaging (MRI), Computed Tomography (CT Scan) and Brain Angiography (AG).

The first stage of treatment planning involves undergoing one or more of the above examinations in order for us to be able to precisely map the target area to be treated. Your Consultant will determine which examinations need to be performed.

MRI Scanning:

A Perspex box will be attached to your head frame. You will be comfortably positioned on a couch, which will then move into the scanner. A contrast agent will be administered into your vein. In order to produce high quality pictures of your brain your head frame will be secured so it cannot move. The imaging time varies but usually lasts 45 minutes. You will feel nothing but will hear a regular drumming noise as the magnetic fields are switched on and off in the scanner. This is normal and nothing to be concerned about. Throughout the examination the staff will be able to see you and speak to you through an intercom. A relative or friend can stay with you in the examination room and you can choose to have music playing during your scan.

CT Scanning

Occasionally a CT scan may be carried out in conjunction with or in place of an MRI scan. A contrast agent may be administered into your vein. After the application of this contrast you may have a hot feeling in your head. This is quite normal and nothing to be worried about. The imaging time usually lasts 15 minutes.



Fig 2: CT with spiral scanning facility



Fig 3: MRI Scan

Brain Angiography (vessel imaging):

This procedure is only necessary in a few cases, mainly patients with arteriovenous malformations (AVM), and your Consultant will have informed you if you will be having this. During this procedure contrast (also called dye) will be administered via an artery. Because we want to image specific arteries in the brain, we use a specialised catheter (tube). The tube is inserted through the femoral artery in the groin. Prior to this procedure, nothing should be eaten for at least four hours but you should continue to drink clear fluids. The groin area will need to be shaved. A local anaesthetic will be injected into the groin area and a small skin incision made to allow the passage of the catheter. The catheter is then placed in position and the contrast injected. At the same time several sets of X-ray pictures may be taken of the artery or arteries. Once again there may be a feeling of warmth or heat in the face or head during the injection, but it will pass quite soon.



Fig 4: Anqioqraphy

When the procedure is finished pressure will be exerted at the site of the skin incision until it has closed. This may take up to ten minutes following which a small dressing will be applied to the site. Afterwards it will be necessary to keep the leg straight for a few hours. Food and drink may be taken after the examination, although it is advisable to have only a light meal and a glass of water initially. It is possible to sit up approximately thirty degrees in bed in order to do this. After six hours it will be possible to walk gently and normal activities can resume the following day providing there have been no complications.

3. Planning your treatment - Stage Two

Once all the necessary examinations have been carried out, and depending on how long the planning process will take, you will either be able to go back to your room (wearing the head frame) or remain in the Gamma Knife department. A Neuroradiologist and a physicist will assist the treating consultant in the planning stage of your radiosurgical procedure. The computerised images taken at CT, MRI or Angiography will now be fed into a computer that maps out the target area to be treated and calculates the exact dose, treatment time and head position. The planning may take some time (in some cases even several hours).

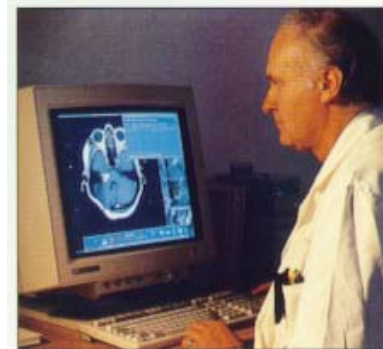


Fig 5: 3D treatment planning

In the interim you will be provided with something to drink. At this time you may also take any regular medication. With the frame in place it is possible to watch television, read or chat with relatives.

4. Your Gamma Knife Treatment - Radiosurgical procedure

When the planning process has been completed (approximately 30min-3 hours after scanning) you will be brought down for your Gamma Knife treatment. In addition to the many experts involved in this treatment cycle your compliance with the whole process is vital.

After being wheeled into the Gamma Knife Treatment Room you will be comfortably positioned on a moving table fixed to the machine. Your head frame will be fixed into the docking device on the treatment couch.

Once your head has been positioned, and Checks have been completed and verified by the Gamma Knife Radiographers, all personnel except you will leave the treatment room. A small microphone is in place so you can communicate with the Radiographers at any time. The Radiographers are able to see you all the time from the operator's room by means of cameras positioned within the treatment room.



Fig 6: Treatment set up

When the treatment commences the door of the Gamma Knife will open and the bed will move you inside the machine. The radiation treatment will begin with the gamma rays precisely focused at the target area. The radiation treatment will be made up of a series of exposures (shots), with each exposure focusing on a slightly different point of the target. The patient positioning system will automatically reposition you to the next shot position. The duration of each exposure can be several minutes, but the whole procedure can

last up to several hours. You will feel no pain from the radiation throughout the whole irradiation procedure.

When your treatment is finished the frame will be removed from your head in the preparation room. The regions where the screws had been attached may bleed slightly and will generally be sensitive for several days.

5. After your treatment.

After the frame has been removed you will be escorted back to your room where you can rest. Should you experience headache or nausea the nurses will provide you with some medication. If you feel fine you may take short walks in the Ward.

Either in the early evening or the next morning, depending upon when treatment started, the Consultant will come to see you and will discharge you. Occasionally patients are asked to stay one extra night when the treated area is close to a part of the brain that might produce temporary side effects. You will be provided with a post-operative leaflet with advice and follow-up guidelines. A full medical report will be sent to your GP/referring doctor.

Your treating consultant will advise you when you need to return for follow-up, this will normally include an MRI scan (and/or angiography for patients with arteriovenous malformations).

Questions and Answers

In the following section we have answered a few of the most frequently asked questions and hope this will help to answer some of yours.

Q. Will the procedure hurt?

A. While the head frame is being fitted under local anaesthetic, you will feel some pain from the injections. The actual Gamma Knife treatment is a totally painless procedure.

Q. How long does the treatment last?

A. Scanning and treatment take most of a day although the time spent lying in the Gamma Knife will depend on the size of the target area and hence how many 'shots' are needed to treat it properly. Each shot lasts from 2 to 30 minutes and therefore total treatment time may range from around half an hour to several hours.

Q. Is it safe?

A. Very safe in terms of the risk of damage to tissue around the target area. If the target area is large or the abnormal tissue requires intense irradiation the main risk is temporary swelling of surrounding areas and a small percentage of patients may experience abnormal feelings, sensations or fits. Such symptoms are very rare, temporary and treatable with drugs.

Q. Will I be radioactive?

A. No. The gamma ray particles pass through the target cells, either colliding with molecules in the tissues or passing out of the body to give up their energy harmlessly in the treatment room.

Q. Will I see or feel anything?

A. No, only sensations where the frame presses on the scalp. You may be aware of a flashing red light in the room, which indicates that treatment is taking place.

Q. How will I feel afterwards?

A. Tired but relieved with some discomfort of the scalp at the points where the frame was held in place. Tension headaches may persist for a day or two. Some nausea may occur during the first 48 hours.

Q. Will I lose my hair?

A. Normally no. Local hair loss may occur with superficially located targets for treatment.

Q. When will I know if the treatment has worked?

A. Generally changes in the target cells take place over many months and this is the reason for regular follow up with MRI scans.

Q. After treatment is there anything I should or shouldn't do?

A.

- Do not scratch the scabs over the pin sites as they act as a barrier to infection and should fall off of their own accord in a few days. You should refrain from washing your hair for a few days for this reason.
- Do not use any types of creams or lotions on the pin sites.
- Do take mild painkillers if your head is still sore on leaving the Hospital.
- If you notice pain, swelling or an increase in redness at the pin sites please go directly to your GP who may give you antibiotics for an infection.

Q. When can I resume my normal routine?

A. You may return to your usual routine as soon as you feel fit enough. This may be the day after treatment or you may feel fit enough after a few days.

Q. When can I go back to work?

A. As soon as you feel well enough. The treatment is non-invasive and there is no reason why you shouldn't go back to work the next day although most patients prefer to have a few days rest.

Q. When will it be safe to fly?

A. There should be no contraindication for refraining from flying unless the Consultant anticipates swelling around the treated lesion. In such cases the Consultant may suggest that you refrain from flying for 2/3 days.

Q. What side effects may I experience immediately and in the longer-term?

A. Immediately you may experience tiredness, headache and some tenderness at the pin sites but these normally only last for a few days. Your treating consultant should have informed you of any longer-term effects.

Q. How will my doctor know that I have had my treatment and how it went?

A. Your treating consultant will write to your GP/referring doctor giving details of your treatment and how it went along with recommendations for your after care.

Q. What will the follow-up care involve?

A. MRI scanning and/or angiography for patients with arteriovenous malformations. Your treating consultant will advise you when these need to be carried out.

Q. When will I know the final results of my treatment?

A. In most cases a successful outcome will be known within two years although in certain cases such as the relief of trigeminal neuralgia, the final results may be earlier. Some medical conditions in themselves require precautionary monitoring over many years.

Q. Who should I contact if I have any problems after the treatment?

- A.
1. Your treating consultant
 2. Your General Practitioner/Referring Consultant
 3. The Gamma Knife Centre here at Bupa Cromwell Hospital

How to find us

Bupa Cromwell Hospital is situated at the junction of Cromwell Road and Marloes Road. Short-term parking is available in the immediate vicinity on parking meters. Earls Court, High Street Kensington and Gloucester Road underground stations are all within walking distance.

Cromwell Road, is served by bus route number 74 and the A1 bus (Victoria Station to Heathrow).



For further information please contact:

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