Convection-enhanced delivery of carboplatin for glioma

Exceptional healthcare, personally delivered
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Your multi-disciplinary care team, including specialist oncologists and neurosurgeons, believes that you may be suitable for a novel treatment known as convection-enhanced delivery of carboplatin. This leaflet aims to give you some background information on this novel procedure, to explain why your brain tumour might be suitable for treatment, and what the treatment involves.

1. Why is this novel treatment being considered for me?

Gliomas are the most common form of malignant brain tumour, and affect approximately 500 people per year in the UK. The mainstay of treatment has been surgery, radiotherapy, and chemotherapy. Despite many advances in surgical technique and chemotherapies, there is still no cure for this type of tumour. Unfortunately, the majority of patients will suffer from a recurrence of their tumour. Once the tumour recurs or progresses after treatment, the alternative options are very limited. You are being considered for convection-enhanced delivery because we believe that this novel treatment has the potential to benefit you.

2. What is convection-enhanced delivery of carboplatin?

Convection-enhanced delivery, or CED, describes a method of delivering a drug directly to the brain through one or more very small tubes (or catheters) which are surgically placed into the brain tumour. Carboplatin is a type of chemotherapy which is normally given to patients through a vein. By infusing carboplatin into the tumour or into the brain tissue around a region of tumour recurrence, it is possible to deliver the drug
more effectively and accurately than if the drug were given through a vein. The doses of carboplatin we plan to infuse have been shown to be very effective in killing brain tumour cells in laboratory studies, but do not cause damage to normal brain cells.

3. Is CED being used in other hospitals?

CED is a novel technique and is not currently used in routine practice. A number of centres are undertaking research in this area around the world, but Frenchay Hospital is the only place in the UK in which this procedure is being performed.

4. What does the procedure involve?

The first stage of the procedure is for you to undergo a very detailed MRI scan of the brain. This is likely to be under general anaesthetic to ensure that we get the best quality scan images. This MRI scan is used to plan how the surgery can be most safely and effectively performed.

Once we have planned the surgery, we will arrange for you to be admitted to hospital for surgery. Under general anaesthetic a frame will be placed on your head which allows us to complete the final stages of surgical planning. You will have a CT scan of the brain which shows the blood vessels in great detail. We will plan to implant up to 4 catheters into or around your tumour.

The surgery involves making an incision on your scalp (or re-opening the previous wound if you have had surgery before). We do not need to shave any of your hair to do this. The first stage of the surgery involves the implantation of plastic “guide tubes” into the brain using a neurosurgical robot. The guide tubes are approximately 1mm in diameter. The catheters are then implanted through the guide tubes, and may be connected to filters which stop air or bacteria being pushed into the brain. The catheters will be attached to a small metal port which is inserted into the bone behind one of your ears. The port protrudes through the skin by 5 mm. Figure 1a shows a diagram...
of the implanted system and figure 1b shows how the port will appear once it is implanted in the skull. Before you are woken up from the general anaesthetic you will have a second CT scan to check the positions of the catheters.

Figure 1a. Diagram of the implanted catheter system.

Figure 1b. Photo of a bone-anchored hearing aid - this is how the port will look after implantation (Courtesy of Science Photo Library).
5. When will I start the infusions of carboplatin?

Once you have recovered from your surgery, it will be possible to start your treatment with carboplatin. This will usually be the day after surgery. The infusions are performed by attaching lengths of tubing connected to syringes to the port behind your ear. You will receive infusions of carboplatin on 3 days in a row. Each infusion could last several hours, depending on the size of the tumour. You may have more MRI scans whilst the chemotherapy is infused to allow us to understand how carboplatin distributes through the tumour and surrounding brain. This will allow us to determine how much carboplatin will need to be delivered to give the best chances of treating the whole tumour. During the infusions you will be closely monitored in the neurosurgical high dependency unit. Once the infusions are completed, and you are well enough, you will be able to go home. After an interval of 4 to 6 weeks, we will arrange for you to come in for a follow-up MRI scan as a daycase procedure.

6. What are the risks?

We have planned the surgical procedure for CED to be as similar as possible to a neurosurgical procedure called deep brain stimulation (DBS). DBS is commonly performed throughout the UK, and we have experience of performing over 800 cases at North Bristol NHS Trust. In DBS surgery, we implant two small electrodes into the brain using guide tubes in a very similar way to how catheters are implanted for CED. Based on our extensive experience with DBS we estimate the following risks:

- **Bleeding in the brain**: approximately 1-2%
- **Stroke**: approximately 1-2%
- **Wound infection**: less than 1%
- **Meningitis or brain abscess (infection)**: less than 1%
  - we connect a bacterial filter to the catheter to try to minimise this risk
Seizures (fits): less than 1%

We have designed the port to be very similar in size and shape to a bone-anchored hearing aid (BAHAs). BAHAs have been safely implanted in patients as a treatment for deafness for over 20 years. Based on the experience from BAHAs we estimate the risks associated with the port to be:

- Minor infection: less than 5%
- Infection requiring removal of the port: less than 1%
- Loss of the port for other reasons: less than 5%
- Poor skin healing around the port: approximately 2%

7. Who should I contact for further information?

Please contact Professor Steven Gill (Consultant Neurosurgeon) or Mr Neil Barua (Registrar in Neurosurgery) via Professor Gill’s secretary.

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