

Information for Patients Receiving Treatment to the Brain or Spinal Cord (CNS)

This information sheet has been written to provide answers to some questions you may have about External Beam Radiation Therapy to the brain or spinal cord (Central Nervous System).

The following topics will be discussed:

- What is radiation therapy?
- Auckland Radiation Oncology Team
- Pre-Treatment Planning
- Treatment Delivery
- Doctor Clinics
- Potential Side Effects
- Craniospinal Radiation
- Conclusion
- Follow-up Arrangements
- Clinical Research

WHAT IS RADIATION THERAPY?

Radiation therapy is a treatment in which an x-ray beam, coming out of a machine called a linear accelerator, is aimed specifically at the site of the cancer. The x-rays damage the DNA (genetic code) in the cancer cells, and this damage then results in the death of the cancer cells. Radiation therapy is planned to treat as little of the normal body as possible. You do not feel the radiation as it is being delivered.

Treatments are usually delivered over a period of weeks, which allows the normal cells to recover between successive treatments. Treatment prescriptions can vary (depending on the needs of the individual) from 5 treatments over 1 week up to 30 treatments over 6 weeks.

ARO TREATMENT TEAM

Your radiation treatment will be given at Auckland Radiation Oncology (ARO) located on the Mercy Hospital campus, 98 Mountain Road in Epsom. ARO is a partnership between MercyAscot and Southern Cross Hospitals. You will meet various members of the team at ARO during your visits. The following is a brief description of who we are and what we do.

Radiation Oncologist - a specialist doctor who is qualified in the treatment of cancer by radiation

Radiation Therapists - qualified technical professionals involved in the planning, scheduling and operation of the radiation equipment in your daily treatment.

Medical Physicist - a scientific officer who performs regular checks to ensure the safety of radiation equipment and treatment plans. The physicist also makes certain that all radiation safety guidelines are implemented and followed.

Registered Nurse – a nurse that has completed their training and has advance knowledge of caring for cancer patients. They will look after you during your visits to ARO. The nurses, along with the radiation therapists, will advise you on how to look after yourself while you are on treatment.

Receptionist/Scheduler – these people will help you with scheduling your appointments, and will be able to discuss your account details.

Engineer – This is a person that has trained on the operation and maintenance of the equipment.

Information for Patients Receiving Treatment to the Brain or Spinal Cord (CNS)



As this is also a training facility, there may be students involved in your treatment. You have the right to ask that students not be present during your procedures.

The therapists, nurses and students work under the direction of your Radiation Oncologist.

We aim to give you the best possible care during your treatment, so if there is anything else you need to know, please ask any one of us at ARO.

PRE-TREATMENT PLANNING

The radiation therapists will work out the best way to position you for your treatments during your pre-treatment planning visit. If you are having treatment to the head region, it is likely that you will have a “mask” made to help hold you in the correct position. Sometimes this mask is referred to as a “shell”.

The planning process will usually require you to have a CT scan of the head or spinal cord. Using the information obtained during the CT, the area to be treated is determined by your oncologist on a computer planning system. The radiation therapists calculate the best method of giving a dose of radiation to the area outlined by your doctor, whilst avoiding as much normal tissue as possible.

Measurements are recorded and checked routinely throughout the course of treatment to ensure the treatment is accurately delivered. The treatment beam can be delivered from several different directions.

TREATMENT DELIVERY

After the CT, time is required to complete the planning calculations. Treatment is started as soon as possible following the completion of this process.

Treatment is usually given once a day, five days per week, with the exception of public holidays. You will spend about 10-30 minutes in the treatment room where the linear accelerator is housed. Plan to spend between 30 and 60 minutes within the centre each day.

When scheduling appointment times, effort is made to accommodate you in regards to work, travel times and your other commitments, but unfortunately this is not always possible. You will receive a copy of your complete schedule on the first day of treatment. We advise you to check these times against your calendar and let us know where there are areas of conflict. We will do our best to change your scheduled times to meet your needs. The more notice you can give us, the more likely we are to be able to assist you with this.

You will be required to lie in the same position as during the scanning process, and we ask that you try to keep as still as possible during the procedures. Your daily treatment requires specific positioning, so it is best if you relax, breathe normally, and allow the therapists to move you as necessary. Once the therapists have positioned you correctly, you will be required to keep still until the treatment is completed.

The therapists must leave the room during the treatment, however, they monitor you on a camera from outside the room. There is also an intercom system, so if you need assistance, call out or give an indication (eg. raise your arm).

You are welcome to bring support people with you when you come for appointments. They may accompany you into the room, but will be asked to return to the waiting room before the therapists begin positioning you for your treatment.

Information for Patients Receiving Treatment to the Brain or Spinal Cord (CNS)

DOCTOR CLINICS

You will see your oncologist in a review clinic while you are on treatment. Clinic days and times are specific to each doctor and every effort will be made for these times to coincide with your treatment times.

Please feel free to speak to the therapists about any questions, concerns or problems you may have; it is not necessary to wait for your visit with the doctor. If the therapists feel you need further, immediate management, they will have you seen by a nurse and/or doctor.

POTENTIAL SIDE EFFECTS

As stated previously, the x-rays used in radiation therapy can damage the DNA (genetic code) of cells. The radiation also affects the normal tissues of the body, and this can cause side effects. However, we know that normal tissues are better able than cancer cells to heal the radiation damage, and most of the normal tissues will recover.

With improvements in technology, including modern planning systems and treatment delivery methods, the side effects of External Beam Radiation Therapy have been reduced remarkably. However, some people may be affected to some extent and the severity of the side effects varies from person to person.

The peak of any reactions/side effects you may experience will occur approximately 7-14 days after the completion of your radiation treatment. This is due to the cumulative nature of the treatment.

Acute Side Effects (Short Term)

These are side effects that occur *during* the treatment course and usually take a few weeks to resolve after completion of treatment. At the beginning of the course you may notice little change, except perhaps, some tiredness. Acute effects appear about half way through treatment and increase in severity toward the end.

Fatigue

General tiredness may occur during and after the treatment course. Some people may still be able to work and only take time off for the daily appointment, but others may find it too tiring and prefer to stay at home.

Skin Reddening and Irritation within the treatment area

The timing of the skin changes depends on the course of treatment prescribed. Your skin may become red, dry, or itchy throughout the treatment course.

Usually the skin reaction is mild to moderate, but in very rare cases, especially if you are on anticonvulsant (anti-seizure) medication, the skin reaction can be severe. Please notify a member of the treatment team if that is the case.

Loss of Hair

Hair loss may be total or partial, temporary or permanent. This is directly related to the dose of radiation prescribed. The higher the dose, the greater the risk for permanent hair loss.

Cerebral Oedema (swelling of the brain)

This is due to inflammation and may cause headaches, nausea, vomiting, and drowsiness. Corticosteroids may be required for the treatment of these symptoms. At this time, the other neurological symptoms that may have been present before treatment could become worse.

Information for Patients Receiving Treatment to the Brain or Spinal Cord (CNS)

Tinnitus (“Ringing” in ears) and hearing loss

In the early stages of treatment this can be a temporary side effect.

Early-Delayed Side Effects

These are side effects which may arise 1-6 months after the completion of radiation treatment.

Somnolence Syndrome

This may cause you to feel very sleepy and irritable, and to experience headaches, nausea, vomiting, loss of appetite. This should resolve within 3-4 weeks, with or without steroid medication.

Temporary worsening of before-treatment symptoms (usually as a result of tumour response eg. swelling around the tumour).

These changes are reversible, with recovery over 6-12 months.

Chronic Side Effects (Long Term)

Most people return to ‘normal’ after completion of their treatment, but a few may experience some long-term side effects. Chronic side effects may arise many months or even years after the completion of radiation therapy. These side effects relate to the ‘scarring’ effects of the radiation therapy on normal tissues within the area of treatment. Chronic side effects usually occur 6 months after radiation treatment and are permanent.

Neurocognitive Effects

This could possibly result in decreased intellectual ability.

Brain Necrosis (tissue death)

Brain necrosis is an uncommon event only occurring after high doses of radiation (+/- 5% of cases), although not impossible. This side effect is radiation induced. It would occur 1-3 years post treatment and symptoms depend on the location of the lesion. It is a very serious complication that may require surgical treatment.

Radiation Induced Tumours

Following radiation treatment, there is an increased risk of developing other brain tumours (approximately 2-3% at 20 years).

If the tumour is located close to the below structures, there are uncommon, but possible late effects that may occur:

- a.) Eye and Optic Nerves
 - Cataracts: painless visual impairment 2-8 years after treatment.
 - Visual impairment from optic nerve damage (6 months – 1 year after treatment).
 - Retinal injury (especially if you are a diabetic or received chemotherapy). This can be asymptomatic or can cause painless loss of vision (partial or total).
- b.) Ear
 - “Ringing” in ear (tinnitus) and hearing loss. This can develop progressively over a few years after treatment and may become permanent.
- c.) Pituitary Gland
 - The pituitary gland may be affected by the radiation and your doctor may want you to have regular blood tests following treatment in order to diagnosis endocrine (hormonal) problems at an early stage.

Information for Patients Receiving Treatment to the Brain or Spinal Cord (CNS)

CRANIOSPINAL RADIATION

Patients who receive radiation to the brain and spinal cord are at risk of developing:

- **Myelosuppression** (low blood counts) as a result of a large volume of bone marrow being irradiated
- **Mucositis** (irritation in the mouth, throat and oesophagus) including reddening and inflammation, swelling and pain. This is a result of the exit dose from the spinal fields.
- **Temporary radiation myelopathy** (inflammation of the spinal cord)
This may occur 2-6 months after treatment, and is characterised by non-painful, but unpleasant electric shock like sensation that shoots down the spine during neck flexion (ie. in a nodding-like movement). The risk is estimated to be 5-10%. This condition resolves spontaneously over a period of a few months to a year.

CONCLUSION

Cranial radiation therapy is an integral part of the management of patients with primary and metastatic brain/spine tumours, and certain types of leukemia. However, this radiation treatment is associated with risks of various early and late toxicities which you should fully understand and discuss with your doctor in the pre-treatment counselling session.

If you feel you need a second appointment with the doctor for further clarification, you should not hesitate to ask for one.

FOLLOW-UP ARRANGEMENTS

At the completion of treatment, an appointment will be made for you to have a follow-up visit with a doctor. The interval between finishing treatment and this appointment varies depending on the area you are having treated and your home address.

CLINICAL RESEARCH

Medical professionals at Auckland Radiation Oncology study the nature of disease and try to develop better methods of diagnosis and treatment. This is called clinical research. We are committed to clinical research with the expectation that we will ultimately improve patient care and patient outcomes. In the discussion of your treatment, your doctor may invite you to participate in clinical research.

We are constantly looking for ways to improve our cure rates. Some of the features of your cancer may make you eligible to participate in a clinical study. If you are interested and eligible, these trials will be discussed with you in detail.