

Prophylactic cranial radiotherapy in lung cancer

General indications for the proposed procedure/treatment:

Prophylactic cranial radiotherapy is the use of radiotherapy to prevent or delay the appearance of lung cancer spreading to the brain, when there are no signs of visible cancer there on scans. It is often called PCI. Prophylactic brain radiation therapy is often given to patients with small cell carcinoma of the lung, as this kind of lung cancer often spreads to the brain. Chemotherapy may not be able to reach the brain, since there is a natural barrier to chemotherapy there. Prophylactic cranial radiotherapy has been shown to improve the chance or duration of survival with and without cancer.

Description of the proposed procedure/treatment:

Radiotherapy is treatment with high energy radiation beams focused at an area of the body. Radiotherapy only affects tissue in the path of the radiation beam. In brain treatment, two beams are directed at the brain. This allows the radiation to be distributed evenly in the target. Blocking parts of the beam allows protection of uninvolved areas. Since the entire brain is at risk for cancer spread, radiotherapy is delivered to the whole brain. 10 to 15 treatments (fractions) are delivered daily Monday through Friday for 2-3 weeks.

In order to aim the radiation precisely, a treatment planning visit (simulation) is required. At this time, a treatment planning CAT scan is done with the patient in the exact position that he/she will be treated. To make sure that there is no movement that could allow improper delivery of radiation, a plastic mask to hold the head in position is often made. The mask is made from plastic webbing that is soft and pliable when warm and rigid and fixed at room temperature. Because the plastic web has many open areas, breathing and vision remain comfortable even though movement is restricted. The CAT scan is then done. The physicians and therapists check the CAT scan and determine points of reference (isocenters) for treatment planning. Marks are then placed on the mask to reflect these reference points to precisely deliver treatment each day

After the patient leaves, the physicians and physicists plan the radiation treatment on treatment planning systems. Treatment is individualized for each patient. The actual treatment usually starts a few days to a week after the treatment planning session.

The course of treatment is variable and dependent on the tumor, patient, and the status of the cancer. The usual course of treatment is daily treatment, Monday through Friday, for two weeks. Starting on a Monday is not essential. Each treatment is scheduled for approximately 15 minutes, but the actual treatment takes as little as 2 minutes. Treatment is scheduled at a particular time daily by agreement between the patient and the therapist.

At the first treatment session, the treatment fields are checked for accuracy before starting treatment. Xrays are taken checking the position and location of the treatment field and

the treatment blocks. These are checked by the therapist and physician. Once approved, the treatment is delivered. For each following treatment session, the patient reports to the radiotherapy department at a scheduled time and is treated. Being treated involves waiting your turn (appointment time), getting into position in the treatment room where the treatment machine (linear accelerator) is located, placement of the mask, occasional xrays to confirm correct position, and the delivery of the treatment. Each treatment is scheduled for approximately 15 minutes, but the actual time the treatment xrays are delivered may take as little as 2 minutes.

Although the patient is aware of where he/she is and the presence of medical equipment, when pictures are taken and treatment is given there is no pain or sensation noted. This is similar to the experience of having a chest x-ray or a CAT scan done.

Treatment is regularly monitored. All treatment plans are double checked by the physicists before treatment. In order to verify accurate delivery of radiation, Xrays of the treatment field are done at least weekly. The patient is monitored by the nurses and physicians at least weekly for symptoms, medications, and other problems.

Material risks and benefits of the procedure:

The **benefit** of radiotherapy is that it kills cancer. Radiotherapy reduces the risk that cancer will ever appear in the brain and may increase length of survival. No guarantee can be given, but many studies have shown that prophylactic cranial radiotherapy reduces risk of cancer ever appearing in the brain.

The **risk** of radiotherapy is that treatment can irritate or damage tissue. Dividing treatment in daily treatments reduces this risk. Because of this concern, studies have shown that 2 to 3 weeks of prophylactic radiotherapy is generally well-tolerated. The radiotherapy can cause swelling which may result in headaches or nausea. Most symptoms are controlled by steroids. A long time after radiotherapy, the patient could have symptoms of mild brain damage, with memory loss, similar to that of a mild dementia. The risk of this happening is related to the radiation dose, but also the patient's health and preexisting conditions such as vascular disease, diabetes, hypertension, and prior problems in the brain and usually takes a long time to develop. These problems do not occur in everyone. Some of these late risks can be reduced by avoiding use of tobacco products.

The **benefit** of radiotherapy generally outweighs the **risk** of radiotherapy. The risk from the cancer is often much higher than the risk from the radiotherapy.

Procedure alternatives, if any:

Since not all patients with small cell carcinoma of the lung spread to the brain, observation, or no treatment, is a choice.

Probable consequences of refusing the recommended procedure:

If cancer appears in the brain at a later date, higher doses of radiation therapy are needed to control the cancer and may not be as effective.

Person(s) providing the procedure/treatment:

Radiation Oncologists (Attending Doctors)
Radiation Therapists
Radiation Nurses
Radiation Dosimetrists and Physicists

All decisions regarding whether, when, and how to treat with irradiation are made by a Radiation Oncologist who is a member of the medical staff of Rush University Medical Center. In addition, the Radiation Oncologist designs, implements, and supervises all aspects of treatment. Often a resident physician participates under the supervision of the Radiation Oncologist. Resident physicians are licensed physicians in an approved residency program. Their level of participation varies with their level of training and ability.

The Radiation Oncologists are assisted by Radiation Therapists, Radiation Nurses, Radiation Dosimetrists and Radiation Physicists.

Radiation Therapists are licensed and certified technicians who are trained to assist the patient at the time of treatment and to administer the daily radiation treatments according to the instructions of the Radiation Physicians. Radiation Nurses are licensed nurses with special training and certification in Oncology Nursing. Dosimetrists are master level technicians with special training and certification in designing radiation treatments. Radiation Physicists are Ph.D. level physicists who have taken special training in Medical Physics. Medical Physics is the discipline that supports the use of radiation for treating patients.

In the Radiation Oncology Department all of the senior physicians and staff are fully trained and either Board Certified or in the process of becoming Board Certified. In many cases, certification requires some years of experience after training as well as passing difficult certification exams.