Radiotherapy / Radiation

Radiation therapy (“radiotherapy”) beams a high dose of invisible radiation directly on tumors damaging the cancerous cells DNA while avoiding the healthy surrounding tissue. Treatment dosage and duration is greater in radiation therapy than the amount used for x-rays and results in sterilizing a tumor and disabling its ability to multiply and grow. This cancer treatment an effective and important part of cancer therapy.The size of the tumor will determine if radiotherapy is used exclusively or combined with another treatments like surgery or chemotherapy. The sequence of treatment modalities in dependent on the type of tumour and the goals of treatment.Radiotherapy shrinks the tumor to make surgery or chemotherapy more effective, and if radiation therapy is used after chemotherapy or surgery, any remaining cancer cells are destroyed. Radiotherapy is also a definitive curative therapy on its own.We use **Three-dimensional conformal radiation therapy (3D-CRT)** to deliver radiation beams from different directions designed to match the shape of the tumor. While the type of radiotherapy chosen depends upon the type of tumor and characteristics of a patient’s cancer case, it is also a decision reached following conversations between the patient and the radiation oncologist.

Dr Ngidi uses the following techniques to treat cancer;
External Beam Radiotherapy - 3D
Brachytherapy
Stereotactic Radiosurgery
Gamma Knife
Radio-isotopes
Rapid Arc/ VMAT
IMRT

External-Beam Radiation Therapy (EBRT)

This is an external treatment where beams of high energy radiation are administered outside of the body and are directed to a target.Higher, more precise doses of radiation target the tumor minimizing damage to healthy tissue and nearby organs and reducing any risk of side effects. It can be given before or after surgery. or be used alone as definitive curative therapy. EBRT can also be used in the palliative setting to alleviate symptoms and offer quality of life. Patients receive EBRT on an outpatient basis over a seven to eight week period five days a week. Treatments take only a few minutes thereby minimally disrupting a patient’s life. This treatment is delivered using a machine called a linear accelerator.

Brachytherapy

Brachytherapy is one type of radiation therapy that's used to treat cancer. Brachytherapy is sometimes called internal radiation. It involves placing radioactive material inside your body. This material can be placed temporarily (e.g. applicators) or permanently (e.g. seeds). Brachytherapy allows doctors to deliver higher doses of radiation to more-specific areas of the body, compared with the conventional form of radiation therapy (external beam radiation) that projects radiation from a machine outside of your body.Brachytherapy may cause fewer side effects than does external beam radiation, and the overall treatment time is usually shorter with brachytherapy. It delivers low doses of radiation locally from implants placed close to, or inside, the tumor(s) in the body and can be administered in one of two different ways. Brachytherapy can be used alone in some cancers or it it used in combination with other treatments like EBRT or surgery.

We use brachytherapy in our practice to treat the following cancers :

- Prostate cancer
- Cervical cancer
- Uterine cancer

Intensity Modulated Radiation Therapy (IMRT)

IMRT is an advanced state-of-the-art radiotherapy treatment that uses computer technology to deliver a precise dose of radiation. The sophisticated computer-guided technique can accurately assess a tumor's characteristics to result in the safe delivery of higher doses of radiation. The goal with IMRT is to successfully shrink a tumor for the best possible surgery outcome and reduce risk of recurrence. The technique is especially helping in treating difficult-to-reach tumors.

The accuracy of this therapy can provide tremendous benefit to a patient and particularly advantageous when a patient's allowable dose of conventional radiation therapy has been exhausted.The goal of IMRT is to conform the radiation dose to the target and to avoid or reduce exposure of healthy tissue to limit the side effects of treatment.

Rapid Arc /VMAT Therapy

Volumetric Arc Therapy (VMAT) or RapidArc® Radiotherapy Technology is an advanced form of IMRT that delivers a precisely-sculpted 3D dose distribution with a 360-degree rotation of the gantry in a single or multi-arc treatment. Unlike conventional IMRT treatments, during which the machine must rotate several times around the patient or make repeated stops and starts to treat the tumor from a number of different angles, VMAT / RapidArc can deliver the dose to the entire tumor in a 360-degree rotation, typically in less than two minutes. RapidArc uses special software and an advanced linear accelerator from Varian to deliver IMRT treatments up to eight times faster than what was previously possible.

Stereotactic Radiosurgery

Stereotactic radiosurgery (SRS) is a highly precise form of radiation therapy initially developed to treat small brain tumors and functional abnormalities of the brain. The principles of cranial SRS, namely high precision radiation where delivery is accurate to within one to two millimeters, are now being applied to the treatment of body tumors with a procedure known as stereotactic body radiotherapy (SBRT).

Despite its name, SRS is a non-surgical procedure that delivers precisely-targeted radiation at much higher doses, in only a single or few treatments, as compared to traditional radiation therapy. This treatment is only possible due to the development of highly advanced radiation technologies that permit maximum dose delivery within the target while minimizing dose to the surrounding healthy tissue. The goal is to deliver doses that will destroy the tumor and achieve permanent local control. Treatment is often a once off only dose but sometimes it can be unto 5 doses.

SRS and SBRT are important alternatives to invasive surgery, especially for patients who are unable to undergo surgery for some tumors and abnormalities.

SRS and SBRT rely on several technologies:

- three-dimensional imaging and localization techniques that determine the exact coordinates of the target within the body
- systems to immobilize and carefully position the patient and maintain the patient position during therapy
- highly focused gamma-ray or x-ray beams that converge on a tumor or abnormality
- image-guided radiation therapy (IGRT) which uses medical imaging to confirm the location of a tumor immediately before, and in some cases, during the delivery of radiation. IGRT improves the precision and accuracy of the treatment

Gamma Knife radiosurgery

Gamma Knife radiosurgery is a type of radiation therapy used to treat tumors, vascular malformations and other abnormalities in the brain.Gamma Knife radiosurgery, like other forms of stereotactic radiosurgery (SRS), is not surgery in the traditional sense because there is no incision.Instead, Gamma Knife radiosurgery uses specialized equipment to focus about 200 tiny beams of radiation on a tumor or other target with submillimeter accuracy. Although each beam has very little effect on the brain tissue it passes through, a strong dose of radiation is delivered to the place where all the beams meet.The precision of brain stereotactic radiosurgery results in minimal damage to healthy tissues surrounding the target.

Gamma Knife radiosurgery is usually a one-time therapy completed in a single day.

Gamma Knife radiosurgery is often a safer alternative to standard brain surgery (neurosurgery), which requires incisions in the skull, membranes surrounding the brain and brain tissue. This type of radiation treatment is usually performed when:

- A tumor or other abnormality in the brain is too hard to reach with standard neurosurgery
- A person isn't healthy enough to undergo standard surgery
- A person prefers a less invasive treatment

In some cases, Gamma knife radiosurgery may have a lower risk of side effects compared with other types of radiation therapy.

Gamma Knife radiosurgery is most commonly used to treat the following conditions:

- **Brain tumor.** Radiosurgery is useful in the management of small noncancerous (benign) and cancerous (malignant) brain tumors. Radiosurgery damages the genetic material (DNA) in the tumor's cells. The cells lose their ability to reproduce and may die, and the tumor may gradually shrink.

- **Arteriovenous malformation (AVM).** AVMs are abnormal tangles of arteries and veins in your brain. In an AVM, blood flows from your arteries to veins, bypassing smaller blood vessels (capillaries). AVMs may disrupt the normal flow of blood and lead to bleeding.Radiosurgery destroys the AVM and causes the blood vessels to close off over time.

- **Trigeminal neuralgia.** Trigeminal neuralgia is a disorder of one or both of the trigeminal nerves, which relay sensory information between your brain and areas of your forehead, cheek and lower jaw. This nerve disorder causes disabling facial pain that feels like an electric shock. After treatment, many people will experience pain relief within a few days to a few months.

- **Acoustic neuroma.** An acoustic neuroma (vestibular schwannoma) is a noncancerous (benign) tumor that develops along the nerve of balance and hearing leading from your inner ear to your brain.When the tumor puts pressure on the nerve, a person can experience hearing loss, dizziness, loss of balance and ringing in the ear (tinnitus). As the tumor grows, it can also put pressure on the nerves affecting sensations and muscle movement in the face.Radiosurgery may stop the growth of an acoustic neuroma.

- **Pituitary tumors.** Tumors of the bean-sized gland at the base of the brain (pituitary gland) can cause a variety of problems. The pituitary gland controls hormones in your body that control various functions, such as your stress response, metabolism and sexual

function.Radiosurgery can be used to shrink the tumor and lessen the disruption of pituitary hormone regulation.