Clinical Excellence
Innovation and Research
Education for the Next Generation

DEPARTMENT OF
RADIATION
ONCOLOGY

Stony Brook Cancer Center
Dear Colleagues:

It is an exciting and transfiguring time in the Department of Radiation Oncology at Stony Brook University Cancer Center. The department has undergone a tremendous transformation, including the addition of new specialized faculty and staff members, expansion and renovation of our clinical area, and the implementation of cutting-edge technologies. We have also made strides in educating the next generation of healthcare professionals by establishing residency training programs alongside our longstanding Medical Dosimetry Program.

Our patients are now treated on the most advanced technologies available. This includes the state-of-the-art Radiosurgery System for stereotactic radiosurgery (SRS) and stereotactic body radiotherapy (SBRT), the high-definition intensity-modulated radiotherapy (HD IMRT), a dedicated high-dose rate (HDR) brachytherapy, as well as oral and intravenous radioisotope treatments. These highly precise treatments are performed by visualizing the targeted tumor with image-guided radiotherapy (IGRT). Even more important than the technology is the expertise of our team that provides high quality individualized treatment to our patients.

In our academic oncology practice, faculty members have opened investigator-initiated prospective clinical trials involving SBRT, including for pancreatic cancers and early-stage lung cancers, as well as pioneering radiosurgery of the brain and spine. A newly developed residency training program will allow future cancer specialists the opportunity to learn high-tech-focused beam treatments under the guidance of our leading investigators. We also provide a training platform for international professionals to learn such high-tech treatments by our world-renowned pioneers.

Thank you in advance for taking the time to become more familiar with our department. We are committed to providing the full spectrum of cancer care at the highest quality in the Department of Radiation Oncology.

You have my assurance that you can always rely on us. We appreciate your confidence in us.

Samuel Ryu, MD
Professor and Chair, Department of Radiation Oncology
Deputy Director, Stony Brook Cancer Center

greetings from the Chair

Clinical Trial Programs with Translational Research

Our clinical trials are tomorrow’s cancer treatments that are being developed today.

- With a patient’s consent, we will find the suitable clinical trial for his or her individual needs depending on the condition of the tumor status and medical health status.
- We are members of the NRG (NSABP-RTOG-GOG) Cooperative Group, Alliance Oncology and the Eastern Cooperative Oncology Group.
- Within the NRG Group, we are the national Principal Investigators of a phase III randomized trial of spine radiosurgery for spine metastasis.
- Stony Brook Cancer Center has ongoing translational research studies, which include those on pancreatic cancer and brain tumors.
- Our overall research is focused on efficiently eradicating tumors while reducing rare, but potential, cancer treatment side effects.

Medical Education Programs

As part of an academic medical center, we are dedicated to teaching and training future healthcare providers.

Residency Training Program

We have an excellent residency training program to educate tomorrow's oncologists. This medical training process is intensive and comprehensive in nature and covers all aspects of oncological care, including detailed techniques of radiotherapy and radiosurgery. Residents are thoroughly involved in the patient’s treatment through this training curriculum.

Physics Residency Program

The physicists are closely linked with each patient’s treatment. They are trained to design and formulate the radiation treatments for radiation oncologists’ complex treatment designs, ensuring that the treatment plans are conformed to the patient’s tumor shape and location. The residents are also responsible for the maintenance of the linear accelerator, which is the fundamental basis of quality assurance for a patient’s treatment.

Medical Dosimetry Program

Our program also trains future dosimetrists who design the radiation treatment plans and calculate the radiation dose according to the doctor’s directives. Their education includes learning to generate the three-dimensional and intensity-modulated radiation plans and assure that the details of each plan are being delivered to the patient’s tumor accurately and appropriately.
Treatments Offered

External Beam Radiation Therapy
- 3D Conformal Radiation Therapy (3D-CRT)
- Intensity-Modulated Radiation Therapy (IMRT)
- Image-Guided Radiation Therapy (IGRT)
- RapidArc® advanced VMAT
- Prone Breast Irradiation
- Partial Breast Irradiation (PBI)

Brachytherapy
- High-Dose-Rate Brachytherapy (HDR) for Intraluminal and Intracavity Treatment
- High-Dose-Rate Brachytherapy (HDR) for Skin Treatment

Radioisotope Therapy
- Oral and Intravenous Isotope Therapy
- Radioimmunoglobulin Therapy (RIT)
- Radioactive Iodine-131 Therapy (RAI)
- Selective Internal Radiation Therapy (SIRT)

Organ Motion Management
- Real-Time Position Management Respiratory Gating System (RPM)
- Deep Inspiration Breath Hold (DIBH) Technique
- Calypso Tracking Beacons (GPS system in the tumor)
- Optical Surface Monitoring System (OSMS) for Motion Management

Total Body Irradiation (TBI)
- TBI standing position
- TBI sitting position
- Total skin electron beam (TSEB) therapy

Most Advanced Equipment
- Varian® Edge™ Radiosurgery System
- TrueBeam® Linear Accelerator
- Trilogy® Linear Accelerator
- RapidArc® advanced VMAT
- Optical Surface Monitoring (OSMS) System
- Calypso System (also known as Body GPS System)
- Respiratory Gating
- High-Dose Rate (HDR) Brachytherapy with Varian X-Ray Afterloader
- 4D CT Simulator with Respiratory Gating
- Eclipse Treatment Planning System
- BrachyVision – Brachytherapy Treatment Planning System
- Aria Medical Record and Image Verifying System
- Many forms of Radioisotopes: I-131, Zevalin, Xofigo, SirSphere/TheraSphere, Sm-153, Sr-89

Stage 1 Lung Cancer

SBRT Treatment After 3 months

After 8 months

After 2 years

cancer.stonybrookmedicine.edu
Evaluation Process for Radiation Therapy

A step-by-step guide for our patients

Consultation. You will meet with the radiation oncologist and nurse for an evaluation and to discuss treatment. You will be given detailed education about the treatment and you can set up appointments to prepare for treatment.

Positioning, Tumor Localization and Tissue Mapping (Simulation). Initial proper positioning is important for the remainder of treatment. Immobilization devices are used to aid in keeping your body in a comfortable and stable position during treatment. A localization Computed Tomography (CT) scan, often with contrast, will be performed to ascertain three-dimensional configuration of the tumor for the purpose of designing optimal and individualized treatment plans.

Computerized Treatment Planning. The images from the simulation are fused with Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET) or other images to create a digital treatment plan for you. The physician will accurately delineate the tumor area and the normal tissues. Dosimetrists and physicists will map out where tissue is located. They design a plan to optimize the radiation dose to conform to the tumor and minimize radiation to healthy tissue and the rest of the body.

Pre-Treatment Quality Assurance (QA). Each treatment plan is unique and complex. Therefore, an in-depth quality assurance check prior to the initial treatment is performed to ensure that the accurate dose will be delivered as it was designed in the individual treatment plan. At this time, all the computerized processes are checked. Patient safety is our top priority.

Verification Simulation (V-sim). This process is a trial run, which is done without the delivery of any radiation. You are placed in the actual treatment simulation position along with the immobilization devices to assure that the treatment can be performed as planned. At this time, measurements will be checked and the beam arrangements will be assessed to make sure they match the treatment plan.

Treatment Delivery. Once you are positioned on the treatment table in the exact same location as in the initial and verification simulation, imaging is used to ensure accuracy as the final step prior to the delivery of treatment. Throughout the delivery of treatment, physicians can use state-of-the-art technology, which contains image-guidance systems, to maintain precise positioning and to visualize the tumor for accurate targeting. Technologies include Cone-beam CT (CBCT), Optical Surface Monitoring System (OSMS), Respiratory Gating and the Calypso® (GPS) system.

Follow up and Surveillance. Throughout the course of treatments, the physician and nurse check your status, once a week or as needed. When treatments are complete, you will be scheduled for follow-up visits to monitor progress post-treatment and evaluate healing and tumor control.

Radiosurgery and SBRT: The New Line of Defense in The Fight Against Cancer

Radiosurgery and stereotactic body radiation therapy (SBRT) are done with an entirely noninvasive treatment procedure that uses focused radiation beams to hit small targets within the brain, spinal cord, lung, liver or any other organs that contain tumors.

To perform radiosurgery and SBRT, Stony Brook’s Department of Radiation Oncology utilizes the latest technology called the Edge™ radiosurgery system, which is one of the most powerful and advanced technologies available. It delivers a focused-beam treatment with precise targeting, respiratory gating and monitoring of the treatment under direct visualization of the tumor. The Edge system is dedicated for radiosurgery and SBRT.

Radiosurgery and SBRT are used for benign as well as malignant conditions in patients who are seeking non-surgical treatment options. Through the use of complex computer algorithms for dose calculations, intricate radiation blocking mechanisms and real-time imaging tracking for volume localization, the Edge stands in a class all its own.
Management of Internal Organ Motion

It is normal to have internal organ movement with breathing and secondary organ changes. Even though the patient is well positioned and immobilized for treatment, the internal organs move on their own. With advanced technologies, these motions can be minimized and tracked to create the most precise treatment possible.

Here are a few of the technologies used to monitor organ and tumor movement throughout radiation treatment:

Optical Surface Monitoring System
AlignRT 3D surface imaging technology automatically and constantly tracks and detects even the slightest body motion in real time, that might occur throughout treatment delivery. It is based on optical detection of skin surface changes in the less-than-submillimeter accuracy.

Body GPS System
Calypso® tracks the target using radiofrequency waves, an innovation referred to as “GPS within the body” technology. Three electromagnetic transponders implanted during a simple outpatient procedure transmit location information about the target (illustrated with the dotted lines in the center photo). The tracking system locks onto the signal during patient setup and tracks it throughout treatment.

Fluoroscopic Imaging of Internal Organ Movement
This image-guidance system tracks tumor motion during treatment by using On-Board Imaging (OBI). It consists of Cone-beam CT and stereoscopic image fusion in real time. This technology shows organs and tissue under fluoroscopic visualization during treatment.

Treatment with Internal Radiation

High-Dose Rate (HDR) Remote-Controlled Brachytherapy
The VarSource iX® system is a completely automated high-dose rate (HDR) after-loading system. Physicians are able to use catheters to place small radioisotope seeds (such as Iridium-192) directly within the tumor, or in body cavities or tissues, often under anesthesia or sedation. Depending on the size and shape of the tumor, multiple catheters can be used. Using the VarSource iX, the radioisotope source travels through the catheter(s) to the target within the tumor or body cavities. Once the dose is delivered, the sources are safely retracted back to the container, making this process extremely precise and safe. At Stony Brook, this treatment modality is performed using an advanced image-guidance system and takes place in the new highly equipped brachytherapy HDR suite. Brachytherapy is used to treat prostate cancer, skin cancer, gynecological cancer, esophageal cancer and tracheo-bronchial cancers.

Radioisotope Treatment
There are multiple radioisotopes that can be used in the treatment of cancerous and benign tumors. The professionals in the Department of Radiation Oncology are proficient in treating a multitude of sites, including:

- I-131 for thyroid cancer (the pill shown in photo)
- Y-90 for liver cancer
- Ra-223 for bone metastasis in patients with prostate cancer
- Sr-90 for benign pterygium of the eye
- Radio-Immunotherapy
We also offer intravenous liquid isotope radiotherapy under angiogram support for selective arterial injection directly into the tumor called selective internal radiation therapy (SIRT).
Why Choose Our Department of Radiation Oncology?

Stony Brook’s Department of Radiation Oncology is accredited by the American College of Radiology (ACR). A national distinction, the ACR seal of accreditation represents the highest level of quality and patient safety.

PATIENT TESTIMONIAL

“The best days that I experienced in Stony Brook’s Radiation Oncology Department were the days that I would sit down with you and the staff and discuss not only how the treatments were going, but more importantly how I was feeling, how was my body handling radiation and its possible side effects. The doctors and staff presented the picture of true cancer healthcare professionals. You are all not only so knowledgeable in your field of medicine, but you also tend to the whole person who is your patient.”

- Father John McGratty

For additional information or to make an appointment, call (631) 444-2200.

cancer.stonybrookmedicine.edu/diagnosis-treatment/radiation-oncology

- World-renowned experts in cancer diagnosis and treatment, providing compassionate care and respecting quality of life
- Innovation and cutting-edge technology for cancer treatment
- Streamlined clinical care in a patient-friendly environment
- Dedicated staff with consistently high patient satisfaction scores
- Academic oncology practice with clinical trials for tomorrow’s treatments
- Nationally recognized treatment programs in your own backyard
The mission and vision of the Department of Radiation Oncology is to provide the best quality cancer care based on exceptional knowledge and experience combined with cutting-edge technology. We provide the best service while accommodating your needs with compassionate care and therapeutic excellence. We prepare for the future by procuring academic achievements and implementing innovative clinical trial endeavors.