

Fox Chase Cancer Center

Comprehensive Cancer Care with State-of-the-Art Technology

The Fox Chase Cancer Center in Philadelphia, PA, has earned the reputation as one of the nation's most comprehensive cancer treatment and research facilities—and for good reason. Its three divisions—medical science, basic science and population science—deploy cutting-edge research, technique, and technology to carry out the Center's core activities.

Through innovative hybridization of imaging modalities, effective deployment of equipment, and an outside-the-box approach to research, Fox Chase has positioned itself at the vanguard in the ongoing war against cancer. In particular, physicians at the 100-bed hospital have pioneered the use of computed tomography (CT) and magnetic resonance imaging (MRI) for prostate cancer treatment.

Interestingly, the facility's implementation of various radiation therapy techniques closely mirrors the evolution of recent radiation therapy technology and methodology. Under the direction of Alan Pollack, M.D., Ph.D, an internationally recognized expert in prostate cancer and other genitourinary cancers, Fox Chase became the first cancer center in the world to use routine MRI planning to help design a more exact radiation treatment plan for cancer. Preceding the arrival of the MRI-simulator, its clinicians used three-dimensional conformal radiation therapy (3DCRT) in prostate cancer treatment to escalate radiation dose and to limit exposure of the bladder and rectum. Now deploying intensity modulated radiation therapy (IMRT), the clinicians can deliver an even more precise radiation dose.

RADIATION ONCOLOGY AT FOX CHASE

Radiation Oncology is the medical use of different kinds of radiation in the treatment of cancer. Specially trained board-certified radiation oncologists are skilled in both standard and unique radiation therapies. The Center's newly expanded radiation oncology facility provides a comprehensive prostate cancer radiation treatment program.

Treatments

MRI Treatment Planning - Fox Chase became the first cancer center in the world to use MRI to help design a more exact radiation treatment plan for cancer, setting a new standard for the delivery of radiation. The Center boasts a developmental suite that houses the world's first MRI dedicated to treatment planning, as well as four new dual energy linear accelerators capable 3DCRT and IMRT. The linear accelerators represent the latest technology. They have built-in, multi-leaf collimators that break the radiation field down into small segments and allow for better automation of radiation delivery in terms of moving from field to field and shaping. More fields can be treated faster and better.

Prostate Brachytherapy – During this radiation treatment, sealed radioactive sources are used to deliver radiation at a short distance inside the tumor. This allows a high radiation dose to be delivered locally to the tumor. The subsequent rapid dose fall-off spares the surrounding normal tissue (the bladder and rectum). Fox Chase utilizes two forms of brachytherapy: permanent “seed” implant, which involves placement of non-removable seeds into the prostate; and temporary high dose rate (HDR) implant, which involves placement of needles into the prostate through which a radioactive source delivers the radiation dose. The source and the needles are removed after treatment. These implants are combined with 3-dimensional conformal external beam irradiation.

3D Conformal Radiation Therapy (3DCRT) – In prostate cancer treatment, this technique enables escalation of radiation dose to tumors while limiting exposure to surrounding healthy tissue. It has proven especially effective in limiting exposure of the bladder and rectum. This has improved patient outcomes while reducing side effects.

Intensity Modulated Radiation Therapy (IMRT) – IMRT allows for even more precise radiation delivery than 3DCRT. A complex technique that uses sophisticated computer-based planning and radiation delivery systems to better conform the radiation dose to the target tissue, IMRT could eventually replace 3DCRT in the treatment of prostate cancer. By permitting higher doses to the tumor at each treatment session, IMRT may ultimately shorten treatment periods. The goal of Fox Chase physicians is to reduce treatment sessions, radiation, and cost to patients while improving the cure rate. Fox Chase is also employing IMRT for more disease sites and is the only facility in the Mid-Atlantic region that offers IMRT for the treatment of breast cancer.

Stereotactic Radiosurgery – This cutting-edge technique precisely locates a specific target within the body using a three-dimensional frame of reference and enables exact placement of high radiation doses. It has proven most useful for tumors in the central nervous system, but it can also be applied to prostate cancer and the treatment of abnormal vascular structure. Like 3DCRT and IMRT, it can destroy tumors with radiation while sparing normal, surrounding tissue.

MR-guided Implants - The Fox Chase staff also is using its MR unit for prostate implants, a technical advance that enables real-time imaging in three dimensions. MR guidance works much more effectively than traditional ultrasound guidance, as the 3D imaging allows for more accurate placement. As the technique continues to improve, MRI will provide a perfect implant for each patient.

Radiofrequency Ablation (RFA) for Lung Cancer – It has been said that this relatively new interventional technique provides “hope for the hopeless”. RFA offers an alternative to resection for patients who can’t undergo surgery, and it appears to have great potential to increase survival, improve quality of life and, in certain cases, even affect a cure. The procedure involves electromagnetic waves that generate heat that destroys small portions of cancerous tissue—a more desirable option than removing part or all of a diseased

organ. A relatively quick and minimally invasive technique, RFA has been employed successfully in the treatment liver and kidney cancers. For lung cancer patients, it can destroy a tumor while sparing the rest of their lung. Other advantages include reduced trauma, shorter recovery time, and less expense. RFA can also be used in the case of recurring cancers, where patients cannot undergo any more radiation treatment because they've reached the maximum allowable dose.

Equipment

Fox Chase's fascinating array of equipment also includes the latest patient positioning devices. These help ensure the effectiveness of precise targeting by compensating for patient set-up variation and internal tumor position changes.

Alpha Cradle – Essentially a Styrofoam bag that conforms to the patient's body, the Alpha Cradle restricts movement during treatment. The Styrofoam molds to the shape of the patient via vacuum suction. The Cradle is especially effective for laser treatments, when consistent alignment is critical.

BAT (B-mode Acquisition and Targeting) System – This ultrasound positioning system was developed by the NOMOS Corporation for use in radiation treatment of prostate cancer. It combines an ultrasound probe and a 3-D positioning tool with a touch-screen-based treatment room interface to rapidly pinpoint target organs at the time of a radiation treatment. It significantly reduces the targeting margins that have traditionally been used to compensate for errors in localization. As a result, the amount of healthy tissue exposed to radiation is reduced.

CT-on-Rails – The CT-on-Rails system, developed by the Siemens Oncology Care Systems Group, enables physicians to target a patient's tumor more precisely just moments before radiation therapy is delivered, ensuring delivery of optimal dosages. The system involves a state-of-the-art CT scanner located in the same room as the linear accelerator. Situated on a rail system, it allows for the spinning of the treatment table. Essentially, the table can be moved while the patient is imaged and treated in the same position. If the target organ has shifted, the CT will identify and correct for the shift so that the target is re-centered. Any targeting corrections that need to be made can be done right before the patient is treated.

INFORMATION TECHNOLOGY ADVANCEMENTS

The Center's highly advanced diagnostic and treatment technology requires appropriate information technology (IT). The Center recently completed a massive IT initiative that provides it with state-of-the-art electronic medical record technology throughout the entire organization. By modernizing its IT systems, Fox Chase not only improved its research capabilities and institutional operations, but the quality of patient care as well.

The upgrades enable deployment of technology crucial in creating a greater pool of information on cancer—its risks, treatments, prevention, and cure. This enables its medical science division to continue providing the best patient care and clinical research, its basic science division to continue its pioneering research, and its population sciences division to better identify people at high risk and to develop strategies to reduce these risks.

Project Overview

Specifically, the project involved placement or development of 17 different large enterprise-class information systems. The upgrades involved both the clinical and administrative components of the organization. Specific IT areas included clinical applications, patient management, departmental applications, infrastructure and Web-access.

The most significant software upgrades include:

CoPath – This anatomic pathology system expands reporting capabilities.

WEBRx – This application provides patient chemotherapy profile and patient medication profile, allowing clinicians to view the drugs that a patient is on.

Mediware WORx Pharmacy Information System – Mediware provides a database that allows clinicians to share and access needed expertise throughout the health care enterprise, and it provides timely and clinically relevant information for delivering medication quickly and without error. It targets medications, checks for likely outcomes on-line, and allows for critical evaluation of therapeutic regimens throughout the duration of therapy.

Impath Cancer Registry – This software and support services system categorizes patients' tumors and places that categorization into a registry. This helps registries produce clinical and market intelligence that promote the growth and success of cancer programs. The ability to access and interpret cancer data easily and cost effectively helps create better treatment opportunities and options. The registry delivers precise information and adds data across multiple locations within large healthcare networks.

Soarian Clinical Applications (SCIFI) – The SCIFI project is cutting-edge product suite developed by the Siemens Corporation that includes eight applications—OpenLink Interface Engine, Clinical Data Repository, Invision and Signature Patient Management and Patient Accounting, Novius Radiology Information System, Enterprise Master Patient Index, Management and Clinical Documentation, Oncology Module Validation, and SoarianPACS.