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Targeted Strike

BY ELIZABETH WHITTINGTON

Radiation therapy is useful in killing cancer cells but it can also damage healthy surrounding tissue. New techniques in imaging and more precise methods in radiation delivery have minimized possible side effects.

Intensity-modulated radiation therapy, or IMRT, uses radiation beams delivered in varying intensities to conform to the three-dimensional shape of the tumor, reducing effects on normal tissue and radiating as many cells throughout the tumor as possible. Computed tomography scans provide the three-dimensional images for the technician to accurately deliver the dose. IMRT is used to treat prostate, breast and lung cancers. An advance in IMRT now includes the aspect of time. Because involuntary movements, such as breathing, can cause the tumor's location to change even by a few centimeters, scientists have developed four-dimensional image-guided radiation therapy. Taking several images over time can help the radiologist focus on when and where the tumor is located throughout a therapy session, localizing radiation to the target to account for real-time motion.

CyberKnife® and Gamma Knife® are types of **stereotactic radiosurgery,** a procedure that involves weak beams of radiation converging on the tumor site from different angles. These radiation beams intersect at the tumor at a high concentrated dose. Because stereotactic radiosurgery does not involve surgery and the surrounding tissue is only exposed to weak doses of radiation, recovery time is less and there are fewer side effects.

Brachytherapy is a form of internal radiation—treatment delivered within or around the tumor via radioactive seeds, wires or needles. A common treatment for prostate cancer, it's also being used for head and neck, thyroid, liver and lung cancers. Specific to breast cancer, partial breast irradiation delivers radiation within the lumpectomy cavity. A specialized form of brachytherapy, MammoSite®, uses a catheter with a saline-filled balloon at its tip, which is placed inside the breast. After surgery, the radioactive seed is delivered via the catheter to the lumpectomy site. Radiation given during surgery, known as intraoperative radiation therapy, is applied as a quick high-intensity beam.