PROSTATE CANCER and 3-D CONFORMAL THERAPY

Mention the phrase “3-D,” and many of us are transported back to childhood, when we sat with expectation in a dimmed movie house, wearing funky paper glasses that made everything jump from the screen. At the time, we thought this was the height of special effects.

In it's infancy, the use of 3-D changed the way we looked at the world. Today, with the use of computer-generated 3-D images, it is changing not only the way we look at ourselves, but also how we treat our medical conditions, in particular cancer.

Among the cancers to benefit greatly from 3-D imaging is prostate cancer.

When a patient is diagnosed with prostate cancer, one of the most commonly prescribed treatments is radiation therapy. During treatment, radiation is used to damage the DNA of cancer cells in order to kill or arrest their growth. This therapy is painless, and has a significantly diminished risk of importance and long-lasting incontinence, which are often side effects of radical prostatectomies (surgical removal of the prostate).

However, because of the prostate's proximity to the bladder, urethra and bowel, irritation can occur during the weeks of treatment, causing urinary and/or bowel urgency and discomfort. These side effects, if they do occur, will usually disappear once radiation treatments are complete.

To minimize the degree of side effects, as well as any possible damage to surrounding healthy tissue, radiation oncologists have begun to employ a therapy known as 3-D Conformal.

The advent of 3-D conformal therapy has expanded the precision in which radiation may be administered to the prostate. By using advanced computer graphics, CT scans and algorithms to precisely generate a visual, three-dimensional image of the prostate, the radiation oncologist is able to determine the best means of delivering radiation within the confines of a tumor. This minimizes the damage to surrounding healthy tissue, maximizes the dosage given, and reduces the degree of side effects.

The process first begins with a volumetric CT scan of the pelvic area. Before scanning begins, an immobilization device of foam or plastic may be molded to the patient. This will e used for precise positioning of the patient during treatment. Then the pelvis is filmed in slices of 2-5mm intervals.

When computerized, these “slices” will be compiled to display the contours of the tumor three-dimensionally on the monitor. With this 3-D image, which allow the radiation oncologist to “see” the tumor from all angles, the best radiation beam arrangements are determined. Again, the goal is to maximize treatment to the tumor, while minimizing exposure to normal tissue.

Once the beam arrangement is selected, the dosimetrist uses a specialized computer program to shape the field of treatment, in order to conform the distribution of the radiation dose to the volume of the tumor. Usually the dose in conformed slightly beyond the tumor itself to allow for patient movement from breathing, as well as slight variations in the daily positioning of the patient, variances in the position of organs (the prostate's position can vary slightly due to how full the bladder or bowel is), and the microscopic spread of the cancer.

Treatment is given 5 days/week, over the course of 6-8 weeks. The overall plan of treatment is broken down in fractions. These fractionated treatments permit healthy tissue to heal in between treatments. Unhealthy cancerous tissue is less efficient at repairing between treatments and will succumb to the cumulative course of radiation.