A Better Look at Prostate Tumors

Magnetic resonance (MR) imaging is playing an increasingly important role in the care of prostate cancer patients, including prostate cancer detection, disease staging and treatment planning. At UCLA, a team of radiologists, urologists, radiation oncologists, pathologists, MRI scientists and technologists work together using advanced prostate imaging to enable more precise diagnosis and treatment. UCLA is also planning studies using MR imaging to guide highly accurate, non-invasive treatments for prostate cancer.

MR imaging

MR imaging includes up to four different diagnostic studies that allow physicians to evaluate a patient's anatomy in exquisite detail, including detecting disease that may not be adequately assessed with other imaging methods, such as X-ray, ultrasound or computed tomography (CAT scans). MR imaging uses a powerful magnetic field, radio-frequency pulses and a computer to not only produce detailed pictures of internal body structures, but also to detect functional properties of cancers, including their chemical signatures. Research at UCLA and other institutions have shown that MR imaging is superior to other imaging modalities, such as transrectal ultrasound, in detecting and localizing prostate cancer.

Preoperative MR imaging

Prostate specialists are increasingly turning to preoperative MR imaging. Detailed MR images provide a roadmap to essential arteries and nerves, which helps physicians treat the cancer while preserving urinary continence and sexual function.

UCLA Health System

MRSI – magnetic resonance spectroscopic imaging

MRSI is a MR technique that detects chemical metabolites in the human prostate gland and distinguishes normal tissue from cancer cells based on the quantities of certain metabolites. It provides functional information on the metabolism and rate of cellular turnover for normal and cancerous tissue based on the levels of citrate, choline, spermine and other chemicals. For example, while the prostate normally contains high concentrations of citrate and spermine, and low levels of choline, prostatic adenocarcinoma (cancer) lowers the level of citrate and spermine, and increases choline significantly.

MR diffusion and MR perfusion imaging

Newer techniques such as MR diffusion and MR perfusion imaging are now being routinely used to better detect and stage prostate cancer and help physicians plan minimally invasive treatments.

Diffusion imaging is a much faster technique than MRSI that, while not as finely detailed as conventional MR imaging, provides information on the degree of cellular crowding. In areas where cancer cells are multiplying rapidly, diffusion imaging can detect the greater crowding of cells. Diffusion imaging has been shown to have higher sensitivity for prostate cancer than conventional MR imaging.

Perfusion imaging has nearly the same fine detail as conventional MR imaging, but provides a map of blood flow, which increases with the proliferation of cancer cells. Cancer cells cause proliferation of new blood vessels (neoangiogenesis), which alters blood flow. New MR techniques can detect this alteration in blood flow during infusion of MR contrast.

Comprehensive treatment

At UCLA, we will be investigating whether non-invasive techniques such as MR-guided high-intesnsity focused US (MR HIFU) or minimally invasive techniques such as irreversible electroporation (IRE) can be used to carefully destroy prostate cancer cells while sparing urinary structures, nerves and blood vessels.

We have a full range of therapeutic modalities, including surgical options such as open prostatectomy, laparoscopic and robotic prostatectomy and prostate cryotherapy. We also offer an array of radiation therapies, including intensity modulated radiation therapy (IMRT), stereotactic body radiation therapy, high-dose radiation therapy (HDR) and seed implantation. UCLA has a variety of clinical trial options for patients with prostate cancer.