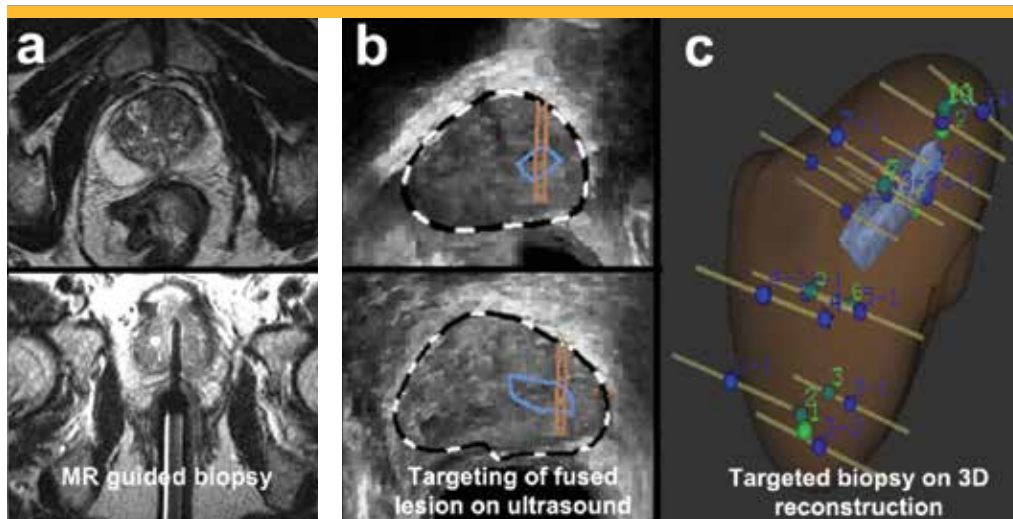


MR-targeted biopsy poised to become the new standard in prostate cancer diagnosis



Direct MR-guided biopsy (a): 59-year-old man with elevated PSA and prior US-guided negative biopsies. T2 MRI showing a central and anterior lesion (above) and MR-guided biopsy showing Gleason 4+3 disease (below).

MR-guided biopsy via MR-US fusion (b & c): In another case (b), the urologist in the clinic uses an image fusion device to bring the region of interest (ROI) into the realtime ultrasound picture and makes a target of the ROI.

(c) Biopsy cores (tan lines) are obtained either aiming at the ROI or systematically throughout the prostate. The site of each biopsy is stored in the device for future recall, if necessary. A recent publication from UCLA describes the results in the first 1,000 men studied in this manner (C.Filson, et al; *Cancer* 122:884, 2016).

Research advances at UCLA with funding from the National Cancer Institute have led to major changes in the way prostate cancer is diagnosed and managed. Targeted MR-guided biopsy via either magnetic resonance-ultrasound (MR-US) fusion or direct MR-guided biopsy is emerging as the best way to detect, grade and stage prostate cancer.

Prostate cancer care has been challenging in part because of the difficulty in distinguishing patients with non-aggressive cancer who do not need treatment from those with aggressive disease who do.

Traditional imaging techniques offer limited contrast between normal and malignant tissues within the prostate, and the relative inaccessibility of some prostate regions can impede detection. Since the mid-1980s prostate cancer has been diagnosed only through “blind” ultrasound biopsies in which multiple tissue samples are systematically extracted from the prostate without the ability to focus on areas of suspicious tissue.

UCLA urology, radiology, pathology and biomedical engineering specialists working in collaboration under the aegis of the Departments of Urology and Radiology have demonstrated that prostate cancer can be diagnosed far more easily and accurately with MR-targeted biopsy.

MRI changing the diagnostic paradigm

“Fusion biopsies tell us with much greater precision and clarity than conventional biopsy what is going on in the prostate,” says Leonard Marks, MD, professor of urology and director of the UCLA Active Surveillance Program. “We are hesitant now to enroll men in active surveillance until they undergo targeted biopsy. Over the course of the past few years, we have seen our prostate cancer imaging tools evolve to the most accurate assessment currently available.”

“It is heartening that individuals from around the world are contacting UCLA seeking an initial prostate diagnosis or second opinion through targeted biopsy,” says Robert Reiter, MD, professor of urology and director of the UCLA Prostate Cancer Research and Treatment Program.

“With accuracy levels that go to 90 percent and higher, MR-US fusion biopsy is becoming the investigative method of choice for all men with suspected prostate cancer. Targeted biopsy is completely changing the diagnostic paradigm,” says Dr. Reiter.

“UCLA is one of very few centers offering both in-bore MR-guided and MR-US fusion biopsy to maximize detection of significant prostate cancer in men,” states Steven Raman, MD, director of the UCLA Prostate Imaging Program.

Better detection and grading accuracy

Using cutting-edge software developed at UCLA in collaboration with the manufacturer, a 3D MRI model of the patient's prostate is generated that can be fused with ultrasound imaging at the time of biopsy, providing a 360-degree virtual map of the gland that reveals suspicious areas with unprecedented clarity. Multiparametric MRI offers additional important information about a tumor's chemical composition, cellular density and blood flow.

Follow-up research at UCLA and other leading institutions confirm initial UCLA findings that MR-US and direct MR-guided biopsy locate 40 to 60 percent more significant prostate cancer tumors than standard biopsy.

For men with prior negative biopsies but persistently elevated PSA (prostate-specific antigen) levels — sometimes elevated due to non-cancerous conditions — and for up to half the 230,000 men diagnosed each year with apparent low-risk prostate cancer who are considering active surveillance or monitoring of the tumor, MR-US and direct MR-guided biopsy provide increased assurance that a low-risk tumor is just that, or that a positive biopsy requires treatment.

A 2014 UCLA study found that conventional biopsy failed to reveal the true extent of prostate cancers in more than one-third of 113 men enrolled in an active-surveillance program whose tumors, after targeted biopsy, were upgraded to “aggressive.”

Leading the way in prostate imaging

UCLA has more experience in MR-US and MR-targeted biopsy than any other center in the United States, having performed well over 2,000 of the two procedures.

Building on the strength of its established research, the team of physicians and scientists continues to refine and broaden its leading-edge studies and clinical trials.

Recent and current highlights include:

- Discovery of the PSCA (prostate stem cell antigen) gene — a protein found in approximately 95 percent of early-stage prostate cancers — and the development of antibodies against PSCA for both the imaging and treatment of prostate (as well as pancreatic) cancer
- Development of C-11 acetate PET (positron emission tomography) — a molecular diagnosis and imaging test in which a radioactive drug tracer that is absorbed by prostate cancer cells can reveal possible advanced or recurrent prostate cancer sites
- Reports from UCLA researchers, along with counterparts at UC San Diego, that RSI-MRI (restriction spectrum imaging) — regulating water volume in the cancer cells — corrects magnetic field distortion, allowing physicians to more accurately plot a tumor's location and extent
- Early-phase trials exploring MRI-guided “lumpectomy-like” focal therapy using MR or MR-US fusion guided laser and ultrasound for prostate cancer

UCLA is one of only 11 centers designated Specialized Programs of Research Excellence by the NCI and an ongoing recipient of the NCI's prestigious RO1 grants — a distinction that recognizes exemplary work in translational research.

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To see a video about targeted biopsy for
prostate cancer, visit: [urology.ucla.edu/
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