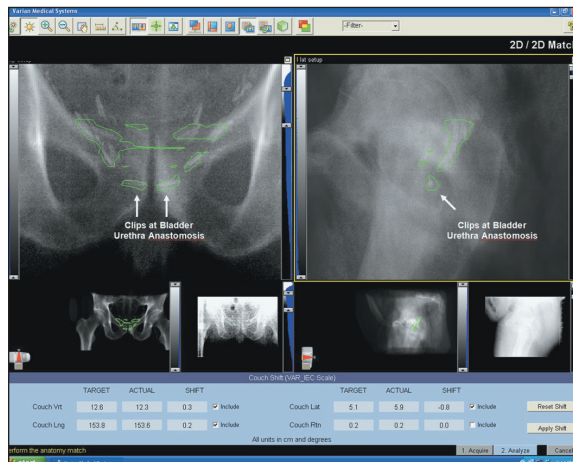
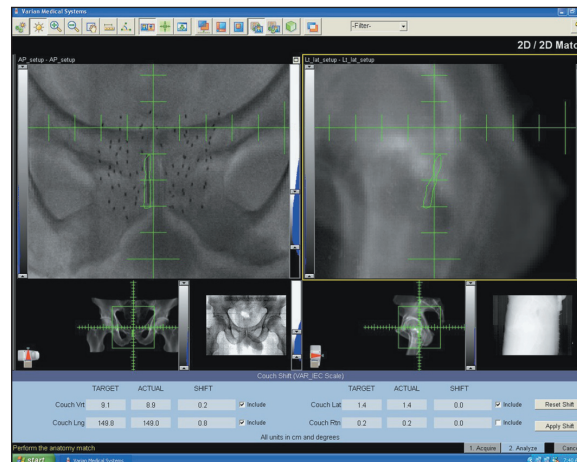


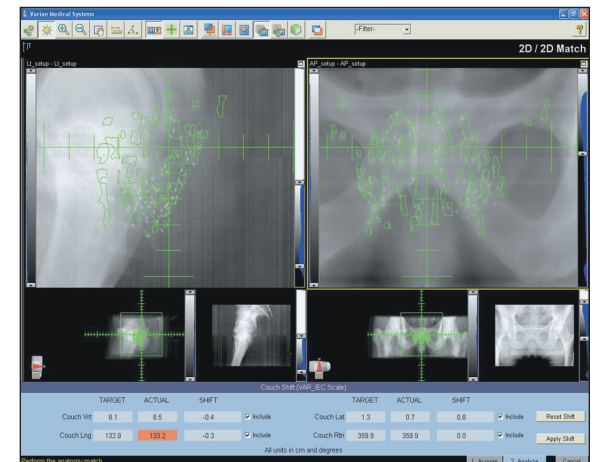
Community Care Physicians Deliver Ultra-Precise Image-Guided Radiotherapy Treatments



IGRT images for a patient with recurrence following prostatectomy. Surgical clips in the prostatic bed were contoured during the planning process and identified prior to every treatment. These clips would not be identifiable using either megavoltage or ultrasound imaging.



A patient following brachytherapy treatment, who had a Visicoil fiducial marker placed during the seed implant process. The marker was outlined during treatment planning and used for image guidance.



Another patient following brachytherapy treatment, with all seeds contoured during treatment planning. The uppermost images were taken after the DRR and OBI images were matched up and aligned.

IGRT (image-guided radiation therapy) is a novel approach to tumor localization, made possible by new technology that combines imaging and treatment on a single machine. Clinicians at Community Care Physicians (CCP) of Latham, New York, have been using the On-Board Imager device from Varian Medical Systems since April 2005 to offer IGRT treatment for prostate and other forms of cancer. In the first month and a half they treated close to 40 patients using the new technology, and find that the system is efficient enough for treating about 30 patients per day.

"IGRT takes an already precise treatment like IMRT and makes it even more accurate," said Robert Desjardins, administrative director. "It enables us to see the tumor at the time of treatment and to make very fine adjustments to the patient's position."

Arun Puranik, M.D., is the director of Image Guided Radiation Therapy at CCP. For his prostate cancer patients, Dr. Puranik starts by having the referring urologist insert a Visicoil gold marker into the patient's prostate. These markers are thin and long — about two centimeters — "not a little seed that can migrate," Dr. Puranik said. The patient's urologist inserts the marker in a one-minute procedure that is much like getting a biopsy.

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All of the imaging for planning and treatment is done with the marker in place. "When we create our treatment plans, we contour the gold marker," Dr. Puranik said. For patients with local recurrence following radical prostatectomy, Dr. Puranik contours the surgical clips in the prostatic bed. "Since the prostate has been removed, in these cases, ultrasound localization is not an option, and we also cannot place new fiducial markers, but we can visualize the prostatic bed using the surgical clips," he said.

"Then, using the On-Board Imager, we visualize the gold marker or the clips every day prior to treatment. We superimpose the images and perform a match, in a "drag and drop" operation that takes about two seconds. The software calculates the positioning correction. We can get a perfect set-up — every day."

Radiation therapists at CCP need about fifteen minutes to generate two orthogonal images and deliver a seven-field IMRT plan. That includes setting up the patient, imaging, image matching and delivering the treatment.

"The speed is partly due to the total integration of Varian's IGRT system," Dr. Puranik commented. "Everything is seamless now, between the Eclipse treatment planning and the VARiS Vision information system, so data transfer is immediate. The treatment proceeds automatically from one angle to the next."

The length of the Visicoil markers makes it possible for Dr. Puranik to obtain what amounts to 3-D information, even when using the On-Board Imager's 2-D radiographic imaging mode.

"When we image the marker, it is not always straight within the imaging plane. By matching up points along its entire length, we can correct the patient's position in three dimensions," he commented.

Dr. Puranik finds that his prostate cancer patients always require positioning shifts. Some are small, in the range of 2-3 millimeters, but some are more substantial, up to 1.5 centimeters.

The prostate cancer treatment protocol employed at CCP involves delivering 180 cGy of radiation to the prostate and seminal vesicles each day to a total dose of 4500 cGy, and then administering an IMRT boost, bringing the prostate dose up to 8100 cGy. For patients who have had seed implants, Dr. Puranik delivers a total of 4500 cGy.

"Even before IGRT, IMRT had given us a much better treatment," Dr. Puranik observed. "Many of my IMRT patients had hardly any problems during treatment, and afterward, the incidence of rectal bleeding and other complications was much less. But IMRT with image guidance takes it another step further," he said.

Dr. Puranik predicts that, by using fused CT and MR image data, doctors will soon be creating prostate cancer treatment plans that spare the internal pudendal artery and the corpus cavernosum. When this happens, IGRT will play an important role. "We'll need the precision of IGRT to accurately position patients for ultra-precise treatments that spare those blood vessels," he said. "That will help us do a better job of preserving erectile function."

For treating tumors in other parts of the body — in the head and neck, for example — Dr. Puranik uses the On-Board Imager to zero in on bony anatomical landmarks near the tumor site, rather than implanted gold markers.

"This is really the most powerful technology we've seen for making sure the treatment isocenter is where it should be," he said. "Everything can look great on the computer, but without IGRT technology, you just don't know what is going on in the treatment room, or under the patient's skin. These days, we're a lot more confident about our set-ups," he said. [\[E\]](#)

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