

# Accurate Prostate Cancer Imaging for High-Dose-Rate Brachytherapy Planning

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## Technology description

### Market Summary

Prostate cancer is the second leading cause of cancer in men in the United States. One treatment option for prostate cancer patients is high-dose-rate (HDR) brachytherapy which uses small catheters inserted into the prostate to deliver radiotherapeutics directly to the prostate. To avoid affecting neighboring healthy tissue, precise placement of the catheters is important. Currently, CT scans are used to identify treatment target (prostate); however, this imaging method is not entirely accurate due to poor contrast. Further advances in 3D treatment planning will allow physicians to administer more accurate and precise doses which would decrease the amount of treatment needed and patient recovery time.

### Technical Summary

Researchers at Emory have developed software to more accurately image the prostate allowing for improved treatment planning. In CT-based prostate HDR brachytherapy, catheter placement is commonly performed under the guidance of intra-operative transrectal ultrasound (TRUS), while treatment planning is based on post-operative CT images. One of the main challenges is accurately defining the prostate volume in CT images due to poor soft-tissue contrast. Researchers at Emory developed an approach that includes intra-operative ultrasound-based prostate volume into treatment planning through TRUS-CT fusion based on the catheter locations. First, 3D TRUS prostate images are captured after catheter insertions during the HDR procedure. Then, the patient receives a post-operative CT scan with all the catheters. The physician contours the prostate volume using TRUS images and TRUS-CT image registration is performed using catheters as landmarks. TRUS based prostate volume is integrated into 3D CT images for HDR treatment planning. Using this integrated approach, the 3D volume of a prostate can be more accurately defined leading to more effective treatment delivery and reduced chance of affecting neighboring tissues.

## Application area

Software to register and fuse TRUS and CT images for use in high-dose-rate brachytherapy procedures.

## Advantages

Integrates intra-operative ultrasound-based prostate volume into treatment planning.

Improves prostate delineation and enables accurate dose planning and delivery which may improve outcomes from high dose rate brachytherapy treatments.

## Institution

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