

Permanent prostate seed implantation requires a transrectal ultrasound (TRUS) unit and software and hardware accessories. Image quality and geometric accuracy of the system directly impacts the accuracy of seed placement. An acceptance testing and commissioning procedure is developed which systematically quantifies the image quality and the geometrical accuracy of the hardware and software used for TRUS guided prostate implant system. Imaging quality and geometric accuracy tests were performed using a standard ultrasound test phantom, as recommended in literature (1). A commercial prostate phantom, containing models of prostate, urethra, and seminal vesicles, was acquired, and tests were designed to verify the geometric accuracy of the transrectal ultrasound unit and the associated software/hardware as a system for the rectal probe. Ultrasound images of the phantom were compared with its CT images for comparison of geometric accuracy, such as distance measurement and volume calculations. Agreements between the ultrasound and CT measurements and calculations were found to be better than 1% in volume and 1 mm in distances. Parameters that affect seed placement accuracy were determined and incorporated into the operating procedure of the system for clinical applications. These comprehensive tests assure continued accuracy of prostate seed implantation procedure.

(1). Carlson, P.L., and Goodsitt, M.M., "Pulse echo system specification, acceptance testing and QC," in *Medical CT and Ultrasound: Current Technology and Applications*, Goldman, L.W., and Fowlkes, J.B., eds. AAPM, 1995