Using an electronic portal imaging (EPI) device, we have measured daily movement of the prostate gland relative to pelvic bony structures during the course of 3D radiation treatment. Three radiopaque markers were implanted under ultrasound guidance in the posterior part of the apex, midgland, and base of prostate in patients with localized prostatic carcinoma. Patients were treated with a four-field box technique and EPIs were recorded each day. The displacements of markers relative to bony structures were measured.

We have completed the analysis of one patient with 23 AP and 23 left lateral images. We studied displacements of each marker relative to the bone and to the other markers as well as to the centroid of the markers. The measurements of the markers relative to bone showed that the motion of the markers was mainly in the anteroposterior and cephalocaudal directions and varied in the range of 0 to 9 mm, while the centroid relative to the bone varied between 0 to 8 mm. No mean changes were found in intra-marker distances, indicating that the markers did not migrate inside the gland, and the size of the gland did not change significantly during the radiation. CT scans obtained pre-and post- treatment also showed no significant changes in positions of markers relative to the bone and to each other.

We plan to analyze 5 more patients and then establish a method for a direct daily pretreatment evaluation of the position of the prostate.