

AbstractID: 1667 Title: A 3D-camera based system for fast planning and monitoring of breast cancer radiotherapy

We have implemented a novel planning and monitoring system for the external-beam radiation therapy of breast cancer that utilizes the three-dimensional (3D) surface information of the breast. The surface data of the breast are obtained from a 3D optical camera that is rigidly mounted on the ceiling of the treatment linear accelerator vault. The 3D camera utilizes light in the visible range therefore it introduces no radiation dose to the patient. In addition to the topographical information, the camera also captures the grey-scale information that is superimposed on the surface. This allows the 3D coordinates of skin markers that are placed on the patient's skin to be obtained quickly and accurately. These skin-marker positions are used in planning and monitoring of the treatment. A three-field corner-block technique has been used to plan the treatment in which the positions of the skin markers are used to define the chestwall plane and the junction plane between the tangential beams and the anterior supraclavicular beam. Based on this input information, the gantry, table, and collimator angles of the tangential beams are accurately calculated. The treatment-planning process in this system, which includes capturing the 3D surface data and subsequent calculation of beam parameters, typically requires only about one minute to complete. Thus, when performed at each fraction of the treatment, this system can provide an accurate positioning check, with minimal additional effort, of the target breast.