

Abstract

This paper describes a software system tailored to planning, viewing and modifying treatment plans for breast cancer brachytherapy treatments. The software is developed based on a new technique of adjuvant partial breast irradiation using ^{103}Pd permanent seed implant developed at Toronto-Sunnybrook Regional Cancer Center [1]. The software uses Visual Tool Kit (VTK) open source and Visual C++. We use VTK to render the 3D CT images and regions of interest, and reconstruct the images from supine position CT scan to oblique direction for breast implantation purpose. The seed planning is done on the reconstructed images and can be viewed in 3D space from any oblique angle. While prostate seed implant is a well established procedure supported by commercial software systems, breast implant is in its infancy and there is no commercial software available to support this treatment. The software we have developed called "Vision" aims at becoming a standard tool for breast cancer brachytherapy treatment. Vision provides the following functionalities: processing DICOM CT images and DICOM ROI structure sets, generating oblique images to allow radiation seeding plantation to be carried out in the direction that is suitable for breast brachytherapy. It includes a source editor for managing ^{103}Pd source model data, and planning and viewing the seeding plan with the CT 3D data set. This editor provides intuitive and accurate visual aid to help oncologists to analyze their treatment plans, and also offers 3D simulator of the seeding procedure. A "fiducial needle" that is used to hook the surgical cavity and that is eventually attached to a template guiding the insertion of needles loaded with the seeds is also been simulated in the Vision software. Vision software has been tested with patients' data and the results are shown in this paper.