

ABSTRACT

COMPARISON OF THE DOSE DISTRIBUTION OBTAINED FROM DOSIMETRIC SYSTEM WITH INTENSITY MODULATED RADIOTHERAPY PLANNING SYSTEM IN THE TREATMENT OF PROSTATE CANCER

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As in other types of cancer, prostate cancer is the deterioration of normal cell growth in the body, known as malign enlargement of the prostate gland. Irradiation which is one of the treatment methods done in two ways as external radiotherapy and brachytherapy. In order to achieve high tumor control rate with minimum side effects Intensity Modulated Radiotherapy (IMRT) planning is used for prostate cancer treatment. Before treatment, all treatment fields in IMRT must be controlled and compared with dosimetrically obtained dose distribution.

In this thesis, dose received by the target volume for IMRT plannings is measured and compared with the dosimetric systems such as thermoluminescent dosimeter (TLD), ionization chamber and 2D-array. For three prostate cancer patients, the treatment plans created with IMRT technique are transferred onto 2D-ARRAY and onto the solid water phantom which TLD studies are carried out. For the patients the results obtained from dosimetric systems are compared with those obtained from IMRT technique. For 2D-ARRAY measurements, the points that passed γ assessment for 3 mm DTA, %3 DD criteria have been found. According to the percentage of the points passed γ assessment, it is determined that 2D-ARRAY measurements have given consistent results with treatment planning system. The differences between point doses measured in ionization chamber and the doses read from planning system have been obtained less than %3. It is found that the difference between dose values of TLDs and planning system are in the range of 1-5%. According to the results the advantages and disadvantages of dosimetric systems are compared with each other.

Key words: Intensity Modulated Radiotherapy, Prostate Cancer, Ionization Chamber, 2D-ARRAY Detector System, Thermoluminescent Dosimetry