RADIATION DOSIMETRY ON THE ACCURACY OF LINEAR ACCELERATOR (LINAC) RADIATION DOSE USING IONIZATION CHAMBER AND THERMOLUMINESCENT DOSIMETER

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

RADIATION DOSIMETRY ON THE ACCURACY OF LINEAR ACCELERATOR (LINAC) RADIATION DOSE USING IONIZATION CHAMBER AND THERMOLUMINESCENT DOSIMETER

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A linear accelerator (LINAC) is an instrument that accelerates charged particles such as electrons or photons using high frequency electromagnetic waves. LINAC is one of the modality that is used in radiation therapy to eliminate cancer cells. With high dosage of radiation, the surrounding healthy cells are prone to be irradiated. Therefore, maintaining the distribution of radiation dose is important. An international code of practice on standards of absorbed dose to water had been published by IAEA, stating that an accuracy of ± 5 % of the prescribed dose is essential. Two types of radiation dosimetry were used for this research; ionization chamber and thermoluminescent dosimetry (TLD). Eight main points of measurement is used to measure the distribution of radiation dose. Both radiation dosimetry are adjusted to the following points and it is fixed on the solid water phantom. The solid water phantom is irradiated with several energy, photon beams 6 MV and 10 MV, electron beams 18 MeV, with the dose of 100 MU. The accuracy of radiation dose at isocenter in all irradiation beams measurement is below ± 5 % of 1 Gy. But, several points of measurement inside targeted area receive more than ± 5 % of the prescribed dose. The average dose outside the targeted area still receives up to 3.4 % to 24 % of the prescribed dose. The amount of radiation dose that is received outside the targeted area may increase risks of patients during radiation therapy.

Keywords: linear accelerator, radiation dosimetry, ionizing radiation beam, ionization chamber, thermoluminescent dosimetry

DEDICATION

I dedicate this thesis for cancer patients, who are still battling for their life.
And I dedicate this work for my beloved family.

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