

THE STUDY OF RADIATION BEAM ATTENUATION CAUSED BY CARBON FIBER COUCH IN DIFFERENT GANTRY ANGLE AND BEAM GEOMETRY IN RADIATION THERAPY

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Purpose : The does calculation of all commercialized treatment planning computer system are based on Computerized Tomography image, but treatment room couch information is not included in CT images, therefore, the delivered does is literally different to the does distribution designed by treatment planning computer system. Especially when radiation beam incident posteriorly under the treatment couch, the phenomenal of radiation attenuation caused by treatment couch should be studied.

Material and Method : This study was to measure the attenuation caused by carbon fiber Exact couch in Varian 21EX Linear accelerator treatment machine, ion chamber was used to take the radiation does converted to reading with 6 cm build up cap at SAD 100 cm isocentrally setup. Field size was set to be 5 by 5 cm², 10 by 10 cm², 15 by 15 cm² with different gantry angle from 0° to 360° in every 5° for 6 MV and 10 MV photon beam.

Results : According to the experimental measurement results, the electrometer chamber reading of those gantry angle which central axis did not penetrate the couch and the supporter compared to 0° gantry angle was within 0.5%, while the attenuation result was within 1% when the radiation penetrate through couch and exclude supporter, and there are six position whose attenuation results are exceed 10% there are at gantry angle 97.5°, 102.5°, 122.5°, 237.5°, 257.5°, 262.5° IEC scale.

Conclusion : The geometry of radiation beam and supporter were related to distance from treatment isocenter to couch surface in the vertical direction, field size, and shift of the couch to isocenter in the horizontal direction. We can get a gantry angle from the relation avoid the radiation to hit the supporter. Therefore, a set of equation was developed to check if the radiation beam penetrates the couch supporter or not.

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Key words: Exact couch, Attenuation, Removable accessory rail