

Pengembangan dan evaluasi derajat kompleksitas berbasis bukaan MLC statik linear accelerator = Development and evaluation of complexity metrics based on static mlc openings of linear accelerator

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Abstrak

ABSTRAK

Tujuan penelitian ini adalah untuk melakukan pengembangan dan mengevaluasi derajat kompleksitas berbasis bukaan MLC statik menggunakan pengukuran detektor matrix Octavius, EPID, film Gafchromic dan dosis titik dan membandingkannya dengan penelitian-penelitian sebelumnya. Pengukuran derajat kompleksitas disarankan menjadi bagian program jaminan mutu teknik penyinaran intensity modulated radiation therapy IMRT dan volumetric modulated arc therapy VMAT . Serangkaian bukaan MLC statik berukuran kecil dan tak beraturan dibuat dalam penelitian ini untuk mewakili bukaan MLC statik pada teknik IMRT dan VMAT. Selanjutnya dilakukan perbandingan antara perbedaan dosis dose difference perhitungan TPS dengan hasil pengukuran detektor matriks Octavius, EPID dan film Gafchromic menggunakan perbandingan perbedaan dosis global piksel per piksel dengan kriteria passing rate 3 mm, 3 . Hasil perbandingan dosis tersebut bervariasi antara 72,67 sampai 100 . Nilai derajat kompleksitas dihitung menggunakan edge area metric, edge metric, converted aperture metric, modulation complexity score, rasio MU/Gy dan circumference per area dengan nilai korelasi Pearson nilai-r menunjukkan hubungan yang cukup linier terhadap kompleksitas bukaan MLC statis dengan nilai bervariasi antara -0.688 sampai dengan -0.999 untuk pengukuran film gafchromic dan -0.714 sampai dengan -1.000 untuk pengukuran EPID.

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ABSTRACT

The purpose of this study was to develop and to evaluate complexity metrics based on static MLC openings by using Octavius Detector, EPID, Gafchromic Film, and point dose measurement, and then compares them to the previous study. Complexity metrics have been suggested to be a part of quality assurance program for intensity modulated radiation therapy IMRT and volumetric modulated arc therapy VMAT techniques. A set of small and irregular static MLC openings were created as a representative of IMRT and VMAT radiation field segment. Furthermore, the dose difference between calculated and measured are evaluated using a pixel by pixel comparison with global dose difference criteria of 3 mm, 3 . The dose difference results were varied between 72.67 and 100 . The complexity scores was calculated by the edge area metric, edge metric, converted aperture metric, modulation complexity score, MU Gy ratio and circumference per area, show good linear those complexity metrics of the static MLC opening with the Pearson rsquo s r values varied between 0.688 and 0.999 for gafchromic film measurement and between 0.714 and 1.000 for EPID measurement.