Pengaruh material homogen dan inhomogen dalam evaluasi gamma index teknik IMRT (Intensity Modulated Radiotherapy) berdasarkan citra pasien fan beam dan cone beam CT = Homogeneous and inhomogenous material effect in gamma index evaluation of IMRT technique based on beam and cone beam CT patient image

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Abstrak

[Telah dilakukan penelitian dalam mengevaluasi pengaruh material homogen dan inhomogen pada teknik IMRT (Intensity Modulated Radiotherapy) menggunakan modalitas Fan Beam CT (FBCT) dan Cone Beam CT (CBCT) terhadap Gamma Index (GI). Perencanaan ulang dilakukan untuk 5 pasien kanker paru kanan pada modalitas FBCT dan CBCT menggunakan TPS Phillips Pinnacle energi foton 6 MV. Menggunakan Teknik IMRT 30 segmen, 50 segmen, dan 70 segmen untuk perencanan terapi. Calculation Grid Resolution (CGR) 0.2 cm dan 0.4 cm digunakan sebagai resolusi dalam perhitungan dosis. Serta kalibrasi bilangan CT (KBC) FBCT, CBCT, dan linear dipergunakan sebagai koreksi CT density number. Pengukuran plannar dose untuk evaluasi Gamma Index (DD 2% / DTA 2 mm, passing rate 90%) dilakukan pada SAD 100 cm dengan material homogen dan inhomogen pada kedalaman 1.5 cm, 5 cm, dan 10 cm. Didapatkan deviasi nilai rata--rata GI antara CGR 0.2 cm dengan 0.4 cm material homogen modalitas FBCT dan CBCT berturut--tutut 1.46% dan 1.13%. Serta deviasi pada material inhomogen sebesar 2.54% (FBCT) dan 1.74% (CBCT). Deviasi Nilai rata--rata GI antara FBCT dengan CBCT dengan CGR 0.2 cm berturut--turut 1.95% (homogen) dan 2.36% (inhomogen). Dan deviasi Nilai rata--rata GI antara material homogen dan material ekuivalen homogen sebesar 0.80%. Dari hasil penelitian yang didapat, bahwa evaluasi Gamma Index dapat dipengaruhi oleh jumlah segmen, modalitas CT, kalibrasi bilangan CT, Calculation Grid Resolution, dan kedalaman material.

.....These Studies have been carried out to evaluate the effect of a homogeneous and inhomogeneous material on IMRT Technique (Intensity Modulated Radiotherapy) using Fan Beam CT (FBCT) and Cone Beam CT (CBCT) for the Gamma Index (GI). The Phillips Pinnacle treatment plan was used to replan 5 patients on right side of lung cancer. Photon 6 MV was applied to this technique with 30 segments, 50 segments, and 70 segments, repectively. Using Calculation Grid Resolution (CGR) 0.2 cm and 0.4 cm for resolution in the calculation of the dose. As well as the calibration of CT numbers (CCN) FBCT, CBCT, and the linear density are used as a correction CT number. The planar measurement for the evaluation of Gamma Index (DD 2% / DTA 2 mm, the passing rate of 90%) carried out at 100 cm SAD with the homogeneous and inhomogeneous material at a depth of 1.5 cm, 5 cm, and 10 cm, respectively. We obtained deviation average value of GI between CGR 0.2 cm and 0.4 cm using the homogeneous material on FBCT and CBCT modality 1.46% and 1:13%, respectively. As well as the material inhomogeneous deviation of 2.54% (FBCT) and 1.74% (CBCT). The deviation of the average GI value between FBCT with CBCT with CGR 0.2 cm respectively 1.95% (homogeneous) and 2.36% (inhomogeneous). Finally, the deviation of the average GI value between homogeneous and equivalent of homogeneous material is 0.80%. From the results obtained, that the Gamma Index can be influenced by the number of segments, modalities of CT, calibration of CT numbers, calculation grid resolution and depth of material.

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material
at
a
depth
of
1.5
cm,
5
cm,
and
10
cm,
respectively.
We
obtained
deviation
average
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of
GI
between
CGR
0.2

cm
and
0.4
cm
using
the
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on
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and
CBCT
modality
≤1.46%
and
≤
1:13%,
respectively.
As
well
as
the
material
inhomogeneous
deviation
of
≤
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(FBCT)
and
≤
1.74%
(CBCT).
The
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the
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and
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Finally,
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between
homogeneous
and
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Key words : Calculation Grid Resolution, Calibration of CT Numbers, Cone]