

LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel) : An improved method for automated calculation of the water-equivalent diameter for estimating size-specific dose in CT

Jumlah Penulis : 7 Orang

Status Pengusul : Penulis pertama/ ~~Penulis ke-2~~/ Penulis Korespondensi **

Identitas Jurnal Ilmiah : a. Nama Jurnal : Journal of Applied Clinical Medical Physics
b. Nomor ISSN : 1526-9914
c. Volume, Nomor, Bulan, Tahun : Vol. 22 No. 9, September 2021
d. Penerbit : American Association of Physicists in Medicine (AAPM)
e. DOI artikel (jika ada) : 10.1002/acm2.13367
f. Alamat web jurnal : <https://aapm.onlinelibrary.wiley.com/journal/15269914>
g. Terindeks di Scimagojr/Scopus atau ~~di...~~ **

Kategori Publikasi Jurnal Ilmiah (beri ✓ pada kategori yang tepat) : ☒ ~~Jurnal Ilmiah Internasional~~ / Internasional Bereputasi **
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b. Ruang lingkup dan kedalaman pembahasan (30%)	11,8	11,1	11,45
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	11,8	10,5	11,15
d. Kelengkapan unsur dan kualitas penerbit (30%)	11,9	11,5	11,7
Total = (100%)	39,4	36,8	38,1
Nilai untuk Pengusul : (60% x 38,1) = 22,86			

Semarang, 1 Desember 2021

Reviewer 1



Prof. Dr. Drs. Muhammad Nur, DEA
NIP. 195711261990011001
Bidang ilmu/Unit kerja : Fisika/Fakultas Sains dan Matematika

Reviewer 2



Dr. Drs. Catur Edi Widodo, M.T.
NIP. 196405181992031002
Bidang ilmu/Unit kerja : Fisika/Fakultas Sains dan Matematika

LEMBAR
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a. Kelengkapan unsur isi jurnal (10%)	4			3,9
b. Ruang lingkup dan kedalaman pembahasan (30%)	12			11,8
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	12			11,8
d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12			11,9
Total = (100%)	40			39,4
Nilai Pengusul = 60% x 39,4 = 23,64				

Catatan Penilaian artikel oleh Reviewer :

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Pendahuluan yang telah mampu menghantarkan pentingnya penelitian. Kebaruan dari penelitian tertera secara eksplisit. Artikel telah ditulis sesuai dengan Journal of Applied Clinical Medical Physics yang diterbitkan oleh (AAPM).
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Ruang lingkup bahasan sudah luas, hasil dan pembahasan sudah didiskusikan dengan mengaitkan hasil-hasil dari referensi. Bahasan yang sangat menarik
- Kecukupan dan kemutakhiran data/informasi dan metodologi:**
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Semarang, 29 Desember 2021
 Reviewer 1



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 Bidang Ilmu: Fakultas Sains dan Matematika

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d. Kelengkapan unsur dan kualitas terbitan/jurnal (30%)	12			11,5
Total = (100%)	40			36,8
Nilai Pengusul = 60% x 36,8 = 22,08				

Catatan Penilaian artikel oleh Reviewer :

1. Kesesuaian dan kelengkapan unsur isi jurnal:

Unsur isi jurnal sudah lengkap sesuai dengan tata cara penulisan yang memuat Title, Introduction, Materials and methods, Results and Discussion, Conclusion, Acknowledgement dan References. Substansi artikel sesuai bidang ilmu penulis pertama.

2. Ruang lingkup dan kedalaman pembahasan:

Substansi artikel yaitu tentang peningkatan metode pengukuran secara otomatis untuk estimasi dosis CT Scan menggunakan metode water equivalent telah sesuai dengan ruang lingkup jurnal, dengan kedalaman pembahasan sangat baik

3. Kecukupan dan kemutakhiran data/informasi dan metodologi:

Data-data hasil penelitian sudah menunjukkan ada kebaruan informasi. Pustaka -pustaka yang diacu sesuai dengan tema penelitian dan sebagian besar pustaka adalah mutakhir.

4. Kelengkapan unsur dan kualitas terbitan:

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Semarang, 23 Nopember 2021

Reviewer 2

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Journal of Applied Clinical Medical Physics • Open Access • Volume 22, Issue 9, Pages 313 - 323 • September 2021

An improved method for automated calculation of the water-equivalent diameter for estimating size-specific dose in CT

Anam C.^a ✉, Mahdani F.R.^a, Dewi W.K.^a, Sutanto H.^a, Triadyaksa P.^a, Haryanto F.^b, Dougherty G.^c

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Abstract

Author keywords

Indexed keywords

SciVal Topics

Chemicals and CAS Registry Numbers

Metrics

Funding details

Abstract

Purpose: The aim of this study is to propose an algorithm for the automated calculation of water-equivalent diameter (D_w) and size-specific dose estimation (SSDE) from clinical computed tomography (CT) images containing one or more substantial body part. **Methods:** All CT datasets were

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Dewi, W.K. , Anam, C. , Hidayanto, E. (2021) *Polish Journal of Medical Physics and Engineering*

A SIMPLIFIED METHOD for the WATER-EQUIVALENT DIAMETER CALCULATION to ESTIMATE PATIENT DOSE in CT EXAMINATIONS

Anam, C. , Arif, I. , Haryanto, F. (2019) *Radiation Protection Dosimetry*

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retrospectively acquired by the Toshiba Aquilion 128 CT scanner. The proposed algorithm consisted of a contouring stage for the D_w calculation, carried out by taking the six largest objects in the cross-sectional image of the patient's body, followed by the removal of the CT table depending on the center position (y-axis) of each object. Validation of the proposed algorithm used images of patients who had undergone chest examination with both arms raised up, one arm placed down and both arms placed down, images of the pelvic region consisting of one substantial object, and images of the lower extremities consisting of two separated areas. Results: The proposed algorithm gave the same results for D_w and SSDE as the previous algorithm when images consisted of one substantial body part. However, when images consisted of more than one substantial body part, the new algorithm was able to detect all parts of the patient within the image. The D_w values from the proposed algorithm were 9.5%, 15.4%, and 39.6% greater than the previous algorithm for the chest region with one arm placed down, both arms placed down, and images with two legs, respectively. The SSDE values from the proposed algorithm were 8.2%, 11.2%, and 20.6% lower than the previous algorithm for the same images, respectively. Conclusions: We have presented an improved algorithm for automated calculation of D_w and SSDE. The proposed algorithm is more general and gives accurate results for both D_w and SSDE whether the CT images contain one or more than one substantial body part. © 2021 The Authors. Journal of Applied Clinical Medical Physics published by Wiley Periodicals LLC on behalf of American Association of Physicists in Medicine

Author keywords

CT dose index (CTDI); patient dose; size-specific dose estimates (SSDE); water-equivalent diameter (D_w)

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How does CBCT reconstruction algorithm impact on deformably mapped targets and accumulated dose distributions?

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Abstract

Purpose: We performed quantitative analysis of differences in deformable image registration (DIR) and deformable dose accumulation (DDA) computed on CBCT datasets reconstructed using the standard (Feldkamp-Davis-Kress: FDK_CBCT) and a novel iterative (iterative_CBCT) CBCT reconstruction algorithms.

Methods: Both FDK_CBCT and iterative_CBCT images were reconstructed for 323 fractions of treatment for 10 prostate cancer patients. Planning CT images were deformably registered to each CBCT image data set. After daily dose distributions were computed, they were mapped to planning CT to obtain deformed doses. Dosimetric and image registration results based CBCT images reconstructed by two algorithms were compared at three levels: (A) voxel doses over entire dose calculation volume, (B) clinical constraint results on targets and sensitive structures, and (C) contours propagated to CBCT images using DIR results based on three algorithms (SmartAdapt, Velocity, and Elastix) were compared with manually delineated contours as ground truth.

Results: (A) Average daily dose differences and average normalized DDA differences between FDK_CBCT and iterative_CBCT were ≤ 1 cGy. Maximum daily point dose differences increased from 0.22 ± 0.06 Gy (before the deformable dose mapping operation) to 1.33 ± 0.38 Gy after the deformable dose mapping. Maximum differences of normalized DDA per fraction were up to 0.80 Gy (0.42 ± 0.19 Gy). (B) Differences in target minimum doses were up to 8.31 Gy (-0.62 ± 4.60 Gy) and differences in critical structure doses were 0.70 ± 1.49 Gy. (C) For mapped prostate contours based on iterative_CBCT (relative to standard FDK_CBCT), dice similarity coefficient increased by 0.10 ± 0.09 ($p < 0.0001$), mass center distances decreased by 2.5 ± 3.0 mm ($p < 0.00005$), and Hausdorff distances decreased by 3.3 ± 4.4 mm ($p < 0.00015$).

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Evaluation of dosimetric functions for a new ^{169}Yb HDR Brachytherapy Source

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Abstract

^{169}Yb has been recently used as an HDR brachytherapy source for cancer treatment. In this paper, dosimetric parameters of a new design of ^{169}Yb HDR brachytherapy source were determined by Monte Carlo (MC) method and film dosimetry. In this new source, the radioactive core has been encapsulated twice for safety purposes. The calculations of dosimetric parameters carried out using MC simulation in water and air phantom. In order to exclude photon contamination's cutoff energy, δ was set at 10 keV. TG-43U1 data dosimetric, including S_k , Λ , $g(r)$, $F(r, \theta)$ was computed using outputs from the simulation and their statistical uncertainties were calculated. Dose distribution around the new prototype source in PMMA phantom in the framework of AAPM TG-43 and TG-55 recommendations was measured by Radiochromic film (RCF) Gafchromic EBT3. Obtained air kerma strength, S_k , and the dose rate constant, Λ , from simulation has a value of $1.03\text{U} \pm 0.03$ and $1.21\text{ cGyh}^{-1}\text{U}^{-1} \pm 0.03$, respectively. The radial dose function was calculated at radial distances between 0.5 and 10 cm with a maximum value of 1.15 ± 0.03 at 5–6 cm distances. The anisotropy functions for radial distances of 0.5–7 cm and angle distances 0° to 180° were calculated. The dosimetric data of the new HDR ^{169}Yb source were compared with another reference source of ^{169}Yb -HDR and were found that has acceptable compatibility. In addition, the anisotropy function of the MC simulation and film dosimetry method at a distance of 1 cm from this source was obtained and a good agreement was found between the anisotropy results.

KEYWORDS

^{169}Yb HDR source, brachytherapy, dosimetric parameters, film dosimetry, Monte Carlo

1 | INTRODUCTION

A ^{169}Yb brachytherapy source with a half-life of 32 days is used in both permanent and temporary implant method and recently has taken into consideration in radiation therapy because ^{169}Yb is an

intermediate energy photon emitter (main photon emissions in the range of 50–300 keV, emission probability weighted mean energy of 93 keV).^{1–3} Because of its attractive properties including high specific activity and easy radiation protection, this source is emerging as an alternative source in high

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