

Reliability of Voxel Gray Values in Cone Beam Computed Tomography for Preoperative Implant Planning Assessment

Type:

Article

Abstract:

Purpose: To assess the reliability of cone beam computed tomography (CBCT) voxel gray value measurements using Hounsfield units (HU) derived from multislice computed tomography (MSCT) as a clinical reference (gold standard). Materials and Methods: Ten partially edentulous human mandibular cadavers were scanned by two types of computed tomography (CT) modalities: multislice CT and cone beam CT. On MSCT scans, eight regions of interest (ROI) designating the site for preoperative implant placement were selected in each mandible. The datasets from both CT systems were matched using a three-dimensional (3D) registration algorithm. The mean voxel gray values of the region around the implant sites were compared between MSCT and CBCT. Results: Significant differences between the mean gray values obtained by CBCT and HU by MSCT were found. In all the selected ROIs, CBCT showed higher mean values than MSCT. A strong correlation ($R = 0.968$) between mean voxel gray values of CBCT and mean HU of MSCT was determined. Conclusions: Voxel gray values from CBCT deviate from actual HU units. However, a strong linear correlation exists, which may permit deriving actual HU units from CBCT using linear regression models.

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Source	International Journal of Oral & Maxillofacial Implants
ISSN	0882-2786
DOI	-
Volume (Issue)	27(6)
Page	1438-1442
Year	2012

Keyword:

Accuracy, CBCT, cone beam computed tomography, Hounsfield unit, bone-density assessments, primary stability, dental use, quality, registration, accuracy, sites

Please Cite As:

PARSA, A., IBRAHIM, N., HASSAN, B., MOTRONI, A., VAN DER STELT, P. & WISMEIJER, D.
2012. Reliability of Voxel Gray Values in Cone Beam Computed Tomography for
Preoperative Implant Planning Assessment. *International Journal of Oral &
Maxillofacial Implants*, 27, 1438-1442.

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