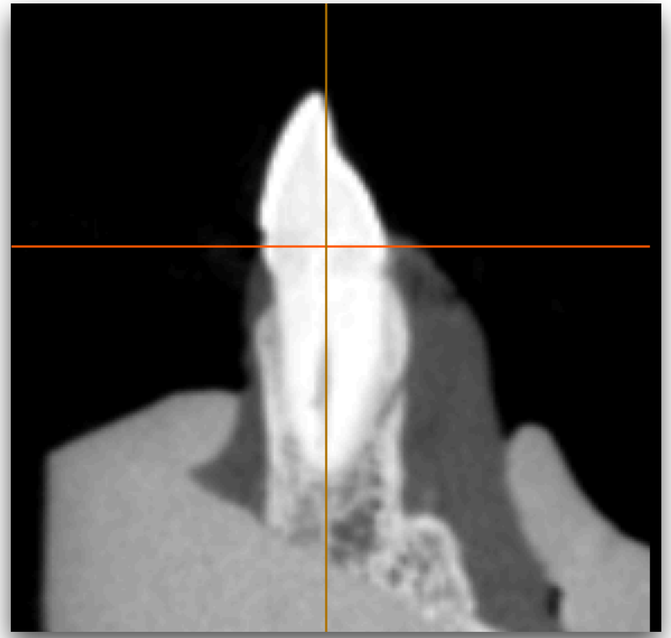
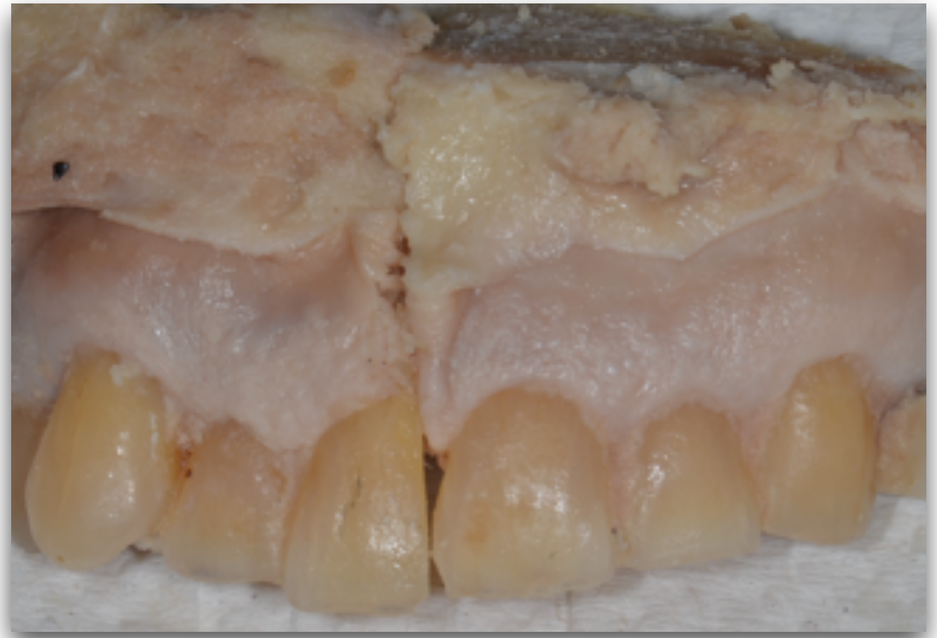
Comparison of measurement consistency with various CBCT settings in the maxillary anterior teeth: Cadaveric study

Y. Tanaka, K. Ferry,
V. Dutra, WS. Lin, Y. Hamada

Indiana University School of Dentistry, Indianapolis, IN, USA





Background & Aim

Field of view (FOV) and voxel size needs to be adjusted based on the area of interest.

The careful selection of exposure parameters will maximize the benefits for patients and clinicians.

However, there is no report to show the consistency of soft and hard tissue measurements with a variety of CBCT settings.

Assessing the consistency of measurements with different CBCT settings

Materials & Methods

5 human formalin-embalmed cadavers

(Department of Biomedical Sciences and Comprehensive Care, School of Dentistry, Indiana University, and the Department of Anatomy and Cell Biology at Indiana University School of Medicine.)

IRB:#1911908477

Anterior maxillary teeth (#11, 12, 13, 21, 22, 23)

CBCT Scans

(iCAT; Imaging Sciences International, Hatfield, PA, USA)

Control	Test 1	Test 2
FOV:16x10cm	FOV:16x10cm	FOV:23x17cm
voxel size: 0.25mm	voxel size: 0.4mm	voxel size: 0.3mm

DICOM files → **Invivo 6 Software**

(Anatomage, 303 Almaden Blvd, Suite 700, San Jose, CA, 95110)

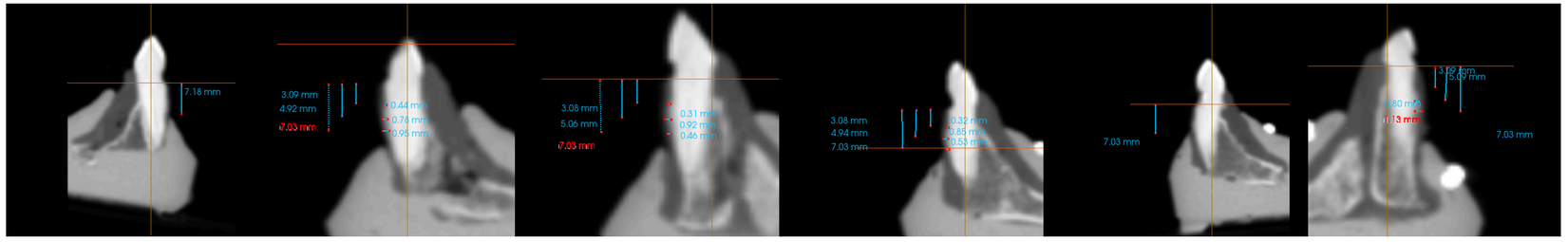
→ **Inter and Intra Examiner Calibration**

inter- and intra-examiner calibrations achieved an ICC >0.90 in two examiners.

Materials & Methods

Buccal bone and **soft tissue** were measured by 2 calibrated examiners.

6 anterior teeth



× **5** cadavers

× **3** different points

P1:3mm
P2:5mm
P3:7mm from the reference notches

= **90** sites in each bone and soft tissue measurements

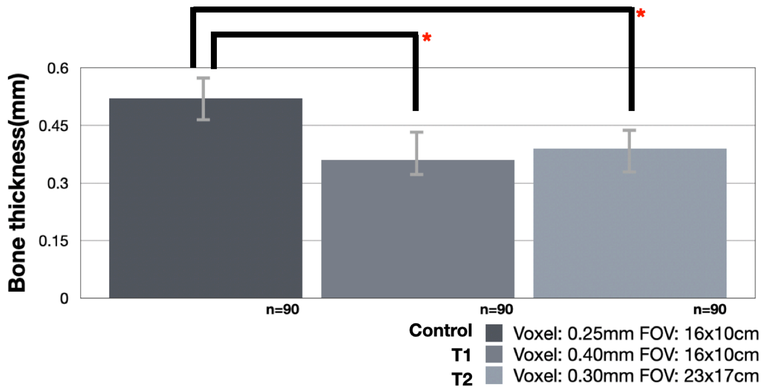
Statistical Analysis

Paired t-tests were used to compare the mean differences between each pair of methods.

Intraclass correlation coefficients (ICC) and **Bland-Altman plots** were used to evaluate the observation-level agreement between the three different CBCT settings (C vs T1, C vs T2, and T1 vs T2).

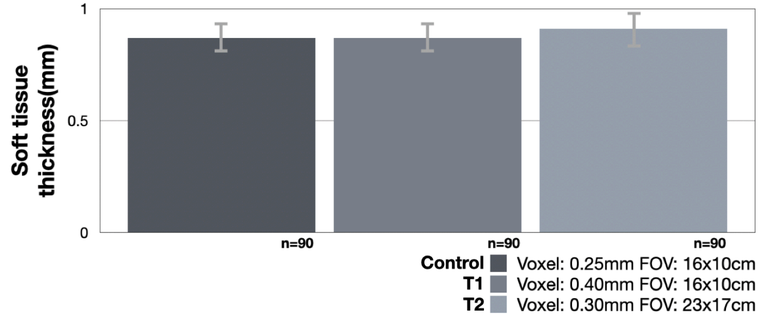
Results

The Mean of buccal bone thickness



The mean of buccal bone thickness decreased in two test groups(p<0.05):
C: 0.52mm, T1: 0.36mm, T2: 0.39mm

The Mean of soft tissue thickness



The mean of soft tissue thickness values were not significantly different between all groups (p>0.05):
C: 0.87mm, T1: 0.87mm, and T2: 0.91mm.

Intraclass correlation coefficient (buccal bone)

Control vs T1	0.60* (n=90)
Control vs T2	0.69* (n=90)
T1 vs T2	0.75 (n=90)

*: Significant at P <0.05

ICC were statistically significant differences between C vs T1 and C vs T2.

Intraclass correlation coefficient (soft tissue)

Control vs T1	0.80 (n=90)
Control vs T2	0.69 (n=90)
T1 vs T2	0.75 (n=90)

ICC for all measurements revealed relatively high agreement between C vs T1.

Conclusion

This study showed that the consistency of three different CBCT settings were not fully reliable with at the level on each individual measurement.

A larger voxel size and FOV do not have a significant impact on the mean of the soft tissue thickness, significantly alters the mean of the buccal bone thickness.

Each clinician needs to be aware that buccal bone and soft tissue thickness measurements can be variable based on the different CBCT settings for clinical use.