Leids Universitair Medisch Centrum

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Proof of concept of CBCT of the human orbit for ocular up-right proton beam therapy

Background

- Up-right radiotherapy gains momentum [1,2].
- Ocular Proton Beam Therapy (PBT) is often performed up-right [3,4].
- No 3D-imaging is performed in treatment position.

Aim

Assess the feasability of using an adapted dental CBCT for images made of the orbital region with a human donor head.

Methods

- A dental CBCT scanner (X-View 3D PAN, Trident Dental) was modified to image the orbital region with a field-of-view of ø11x11 cm and recotom reconstruction.
- The Catphan 503+ was scanned for quality assessment.
- A defrosted human donor head was scanned from 61 - 85 kVp with 10 mA.

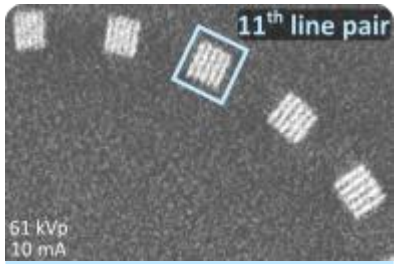

Figure 1: Catphan resolution plate. The resolution is 0.45 mm.

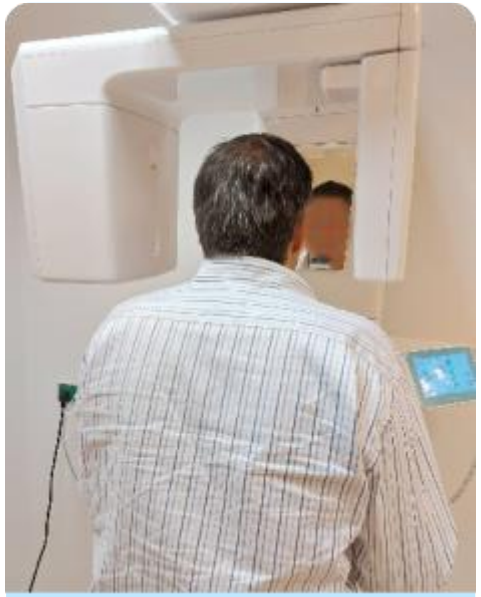

Figure 2: The ocular CBCT set-up.

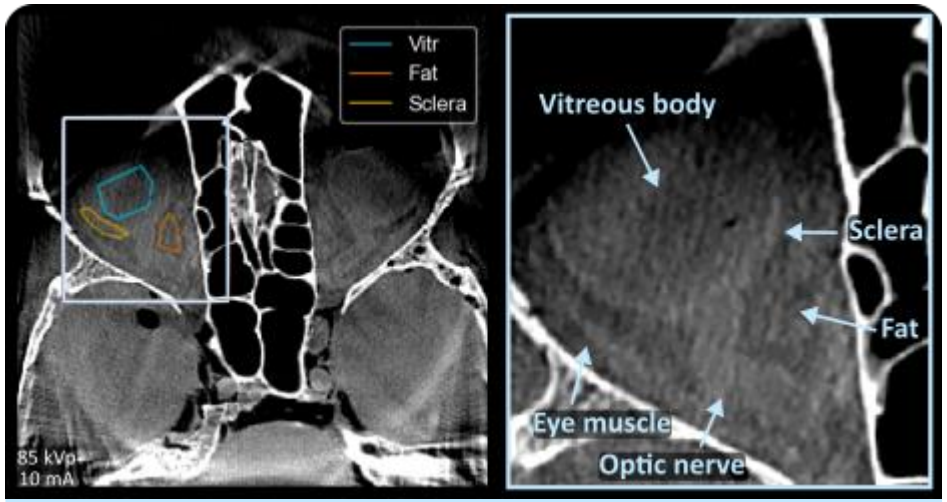

Figure 3: CBCT image of donor head. Full image with three ROIs (left) and zoomed in image with the annotated ocular structures (right).

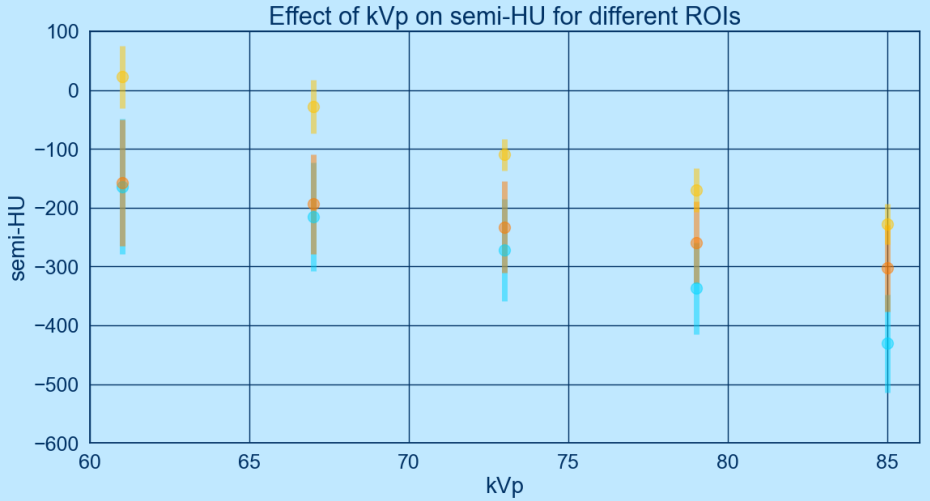

Figure 4: The relation between the kVp and the semi-Hounsfield Unit (semi-HU). The dots and bars represent the mean and standard deviation of the semi-HU.

Conclusion

These initial data show the feasibility of CBCT imaging of the orbit and surrounding structures, which opens a path to more advanced imaging applications in up-right positions, including PBT at, for example, a dedicated eye line.

References

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Disclosure

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Dr. Lonati is employee at Trident Dental.
Dr. Sakas and Dr. El Hakimi are employees at MedCom GmBH.

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