

Forensic cranio facial reconstruction using Cone Beam Computed Tomography current concepts and future research

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ABSTRACT

After attending this presentation, attendees will be aware of the fact that there is indispensable need of adding Cranio Facial Reconstruction (CFR) data base using Cone Beam Computed Tomography (CBCT) of various populations for forensic facial reconstruction (FFR) purposes.

The aim of this review paper is to give an exhaustive and critical review on the advantages of using CBCT over other 3D reconstruction techniques. Conferring facial soft tissue thickness (FSTT) population studies data base of varied population till date defined within a common framework of facial identification. Further the paper will also discuss the deficiencies in research data base of FFR with CBCT in various populations and focusing to create awareness of future requirements.

Extensive online searches were conducted and with all kinds of evidence exists an overview is provided. The main purpose of craniofacial approximation is to recreate a likeness of facial appearance from an unidentified skull using the relationship between facial soft tissue thickness (FSTT) and the skull.^{1,2}

CFR techniques can be classified into three categories: the anatomical Russian method, the anthropometrical American method and the combination Manchester method.³ For approximate facial reconstruction of the human face it is necessary to know the average facial soft tissue thickness of specific sites on the face. This requires establishing a database of soft tissue thickness related to age, sex, race, ethnicity,⁴ skull shape,⁵ nutritional status⁶ and body mass index.⁷

Many imaging techniques like, magnetic resonance imaging (MRI),⁸ computed tomography (CT)⁹ ultra sound (US)² and cephalometric radiographs¹⁰ have been used till date to study the FSTT.

It's been shown recently that CBCT images of the face are a much reliable method of measuring the soft tissue thickness in the facial region and give a good representation of the FSTT.⁴ It has a number of advantages over other methods like increased speed of data collection, less invasiveness and the ability to obtain a 3D archive of the subject's facial morphology. CBCT visualises high-contrast in sufficient quality with a remarkable low level of metal artefacts.¹¹

A review of literature reveals that studies have been conducted on various populations using different imaging techniques to compile the data set.¹²⁻³¹ In disparity, very few researches have been conducted in Netherlands,³² Dundee³³ and Korea.^{34, 35} for CFR with CBCT and these studies comprise small sample size,

varying in their method of extraction, number and position of landmarks, condition of the body and sub-categorization of the data.

The goal is to retrieve the facial recognition setup automatically using facial measures of similarity, to have identification success that can be obtained more accurately with CBCT¹. The tool should be free to the community for making stronger data base impending use in practice.

Finally, we conclude this review by suggesting future directions of need to collect as much CFR data as possible using CBCT with set norms among different populations and subsequently performing validation to increase the practical relevance of CFR methods in crime-scene investigations.

References

1. P. Claes, D. Vandermeulen, S. De Greef, G. Willems, J.G. Clement, P. Suetens, Computerized craniofacial reconstruction: conceptual framework and review, *Forensic Sci. Int.* 201 (2010) 138–145.
2. De Greef S, Claes P, Vandermeulen D, Mollemans W, Suetens P, Willems G. Large-scale in-vivo Caucasian facial soft tissue thickness database for craniofacial reconstruction. *Forensic Sci Int.* 2006 May 15;159(Suppl 1):S126–46.
3. W.J. Lee, C.M. Wilkinson, H.S. Hwang, An accuracy assessment of forensic computerized facial reconstruction employing cone-beam computed tomography from live subjects, *J. Forensic Sci.* 57 (2012) 318–327.
4. Fourie Z, Damstra J, Gerrits PO, Ren Y. Accuracy and reliability of facial soft tissue depth measurements using cone beam computer tomography. *Forensic Sci Int.* 2010 Jun 15;199 (1–3):9–14.