Editorial

Foreword to the Special Issue on Cone-Beam Computed Tomography Imaging in Dentistry

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It is a great honor and privilege to present this Special Issue on "Cone-Beam Computed Tomography (CBCT) Imaging in Dentistry". CBCT is one of the significant key components, which symbolizes the next phase of dentistry [1]. The use of CBCT images enhances both diagnosis and treatment planning; improved planning and greater confidence in diagnosing are just a few of the outcomes. CBCT is used in maxillofacial 3D imaging and has applications ranging from the diagnosis of dentomaxillofacial abnormalities [2], implantology [3], orthodontics [4], endodontics [5], cleft lip and palate [6], obstructive sleep apnea [7], maxillofacial traumatology [8], temporomandibular joint pathology [9], and orthognathic surgery [10] to forensic dentistry [11].

The CBCT radiation risk and doses vary but remain at the lower end of the medical exposure risk [12].

Artificial intelligence tools can use images from cone beam computed tomography and soft tissue scans for patient management and intervention prognosis [13–15].

Medication-related osteonecrosis of the jaw (MRONJ) is a severe consequence connected to the administration of drugs for the treatment of osteoporosis, malignancy, or immunological disorders, such as antiangiogenic drugs or antiresorptive medication [16]. CBCT imaging, however, may be used to investigate MRONJ [17]. Because CBCT is required to identify the true amount of MRONJ, it is worthwhile to undergo a CBCT on a regular basis [18]. Semi-automatic cone-beam computed tomography imaging delineation may be exploited to assess the amount of MRONJ abnormalities on CBCT [19].

The introduction of CBCT has unquestionably enhanced diagnosing precision and therapeutic management.

In orthodontics, CBCT may be implemented to assess lateral incisor resorption caused by upper canine impaction [20]. CBCT may be additionally used to evaluate miniscrew-assisted fast palate enlargement and its impact on the respiratory system [21].

CBCT can also be employed for image-guided surgeries and image-guided radiotherapy treatment, since it allows for increased picture resolution by altering picture geometric features, and it also enables screen resolution enhancement, a field of vision enlargement, and metal distortion decrease [22].

In maxillofacial surgery, CBCT may be employed to monitor osseous modifications after the insertion of a sinus floor bony transplant [23], as well as for maxillary sinus features in cleft lip and palate patients [24], even in computer-assisted orthognathic surgery [25]. In implantology, CBCT is an essential tool, since it may be used to analyze bone characteristics around implants [26]. CBCT may be used to identify morphological changes or illnesses of the maxillary sinuses [27], the most frequent sinus abnormalities, as well as to give a strategy for deciding whether additional sinus assessment is required [28]. ENT specialists and maxillofacial surgeons may employ CBCT to investigate the nasal cavity and paranasal sinuses [29].

CBCT may be useful to assess the efficiency of root canal fillings and the occurrence of periapical infections in endodontic therapy [30] and in determining the contact of the posterior maxillary roots and the sinus [31].

In periodontology, CBCT has a high resolution for identifying furcation involvement and the tissue architecture, as well as diagnosing osseous abnormalities [32].

CBCT might also be utilized as a part of a method for developing a computerized simulated patient [33].

Despite the rising popularity of CBCT in dentistry and its routine usage, it has a few drawbacks that must be considered to improve image resolution and provide an accurate diagnosis. Some the limitations are artifacts [34,35], which are defined as inconsistencies within the reconstruction of the graphic image and the real information of the patient that deteriorate the clarity of CBCT scans, and may develop as a result of patient mobility, as well as the picture acquisition and building [36]. The major drawback of CBCT is that it generates lower image contrast than fan-beam computed tomography, making it difficult to visualize soft tissue, although CBCT has higher spatial clarity [37]. Furthermore, the shortcomings of CBCT comprise greater doses than conventional radiographs, and a poor association to Hounsfield units for uniform osseous density estimation [38].

To reduce metal artifacts and enhance soft tissue imaging an incremental CBCT, a reconstructing technique was developed [39]. In addition, a deep learning approach has been developed for eliminating metal artifacts in CBCT images [40].

This Special Issue aims at compiling the most recent and advanced dental scientific studies into a coherent collection of evidence using prevailing CBCT images in treatment planning and diagnosis, as a guide for further research and innovation.

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