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Editorial

Special Issue on Dental Materials: Latest Advances and Prospects—Volume II

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Many fields of dentistry are firmly connected to innovative materials, and the highest clinical improvements frequently come with the development and creation of original and high-performing equipment, instruments, and biomaterials. Nowadays, the application of these dental materials leads to effective clinical dentistry, with many remarkable advancements. In recent times, many fields of dentistry have used these newly developed materials: implantology, prosthesis, restorative dentistry, orthodontics, and endodontics. However, this production often presents a lack of reliable scientific research, and, unfortunately, clinicians tend to make use of materials that are not necessarily better than the previous ones.

The aim of this Special Issue is to publish high-quality research articles, clinical studies, and review articles centered on the latest advances regarding dental materials.

A total of 15 papers (9 research papers and 6 review papers) are presented in Volume II of this successful Special Issue.

Hadzik et al. evaluated the long-term effectiveness of using the guided-bone-regeneration (GBR) procedure to correct small peri-implant bone dehiscence, using a xenogeneic deproteinized bovine bone mineral material and a xenogeneic native bilayer collagen membrane. The authors concluded that using xenogeneic bone and a xenogeneic collagen membrane in a GBR procedure could be used to correct small peri-implant bone dehiscence [1].

Fernandez Castellano et al. focused on maxillary sinus lift procedures performed on animal models, using a balloon elevation control system technique. The maxillary sinus lifts performed via this innovative device associated with the balloon technique are minimally invasive procedures. The elevations achieved sufficiently allowed the future placement of implants of varying lengths and diameters without any risk of perforating the membranes, even in the presence of extremally resorbed bone crests [2].

An Italian study group evaluated the influence of manual expertise on static computer-aided implantology (s-CAI) in terms of accuracy and operative timings. After the cone-beam CT scanning of eleven mandibular models, a full-arch rehabilitation was planned, and two different operators performed s-CAI. Finally, the distances between the virtual and actual implant positions were calculated. The mean value of the operative timings was statistically inferior to that of the expert operator, with an improved accuracy over time for both operators. The support from digital surgical guides did not eliminate the importance of manual expertise for the reliability and shortening of the surgical procedure, and it required a learning pathway over time [3].

Felice et al. hypothesized that virtual planned guided bone regeneration (GBR), with the aid of customized meshes, could optimize the treatment of extended alveolar defects by reducing the risk of dehiscence. The authors concluded that a careful evaluation of the soft tissues and knowledge of their final relationship with the implant and prosthesis can improve digital mesh/membrane manufacturing, with a suitable healing process occurring up to implant placement and loading, as well as favoring peri-implant tissue stability over time [4].

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A systematic review by Desnica et al. evaluated current in vivo research on regenerating critical-sized mandibular defects and discussed methodologies for mandibular bone tissue engineering. Out of the 3650 articles initially retrieved, 88 studies were included in the review. Using scaffolds with bioactive molecules and/or progenitor cells enhanced success in mandibular bone engineering. Therefore, scaffold-based mandibular bone tissue engineering could be introduced into clinical practice due to its proven safety, convenience, and cost-effectiveness [5].

A narrative review by Selahi et al. aimed to review the literature on using autologous blood preparations, which can aid regenerative processes when applied to extraction sockets. The authors stated that, unfortunately, there is a lack of studies in the current literature comparing the amount of pro-inflammatory cytokines in a patient's peripheral blood to their levels after centrifugation in blood concentrates. Therefore, more studies are needed to clarify the correlation between pro-inflammatory cytokine levels and alveolar healing after extraction and assess the risk of treatment with blood concentrates in patients with systemic diseases causing chronic inflammation [6].

A retrospective study by Mummolo et al. aimed to evaluate a possible correlation between the characteristics of the mandibular ramus and lower third molar impaction by comparing a first group of subjects to an impacted lower third molar and a second group to normal eruption for an early prediction of this pathology. This comparison was made using linear and angular measurement, taken via digital panoramic radiographs. This manuscript showed that the angle of a lower third molar, in relation to mandibular pain, can be an index to predict tooth inclusion [7].

A narrative review performed by a Mexican study group summarized the characteristics of dental stem cell (DT-MSCs)-derived biomaterials and their classification according to their source, bioactivity, and different biological effects on the expansion and differentiation of DT-MSCs. Also, the advances in research into the interactions between these biomaterials and the molecular components involved (mechanosensors and mechanotransduction) in DT-MSCs during their proliferation and differentiation were analyzed. The authors concluded that these kinds of biomaterials can contribute to research into regenerative medicine and the development of autologous stem cell therapies [8].

Recently, digital dentistry began to play a crucial role in many dental disciplines, especially the orthodontic field.

Regarding digital dentistry, Shopova et al. aimed to demonstrate and compare the capabilities of two different digital approaches (intraoral scanning and digital examination of occlusion) in the final analysis of occlusion after orthodontic treatment. The authors found that there is a good collaboration between intraoral scanning and digital occlusion determination, since the digital occlusion imaging system provides comprehensive results and allows the analysis and treatment of occlusal dysfunctions. It can provide information on the first contact, strength of the contacts, contact distribution on each tooth, sequence of contacts, maximum bite force and maximum intercuspation, path of the lower jaw movement, and occlusion and disocclusion times, as well as record videos with the active sequences and distributions of the contacts [9].

Bucur et al. published a manuscript with the aim of determining the intensity of pain perception in patients undergoing fixed orthodontic treatment, analyzing the severity of pain during four routine procedures (placement of separating elastics, ring cementations, arch activations, and elastic tractions). Patients suffered differently from the intensity of perceived pain as they grow older; most of them showed moderate pain after following the studied orthodontic interventions and required analgesic medication. The least painful procedure was the elastic traction procedure, while the most painful period was the first 3–4 days after procedures [10].

The original article by Cameriere et al., conducted on a sample of 538 cephalograms derived from healthy-living children aged between 5 and 15 years old, proposed a statistical model to assess pubertal growth spurt using the ratio of the anterior height projection to the posterior (Vba) of the fourth cervical vertebra body (C4), as well as calculate the

residual proportion of skeletal maturation and the time for the pubertal growth spurt to end for a given Vba. The validation process results showed that the proposed model did not produce any incorrect forecasts. Therefore, this proposed method could estimate the beginning and end of the pubertal growth spurt, together with the residual proportion of skeletal maturation for a given Vba [11].

An in vitro case study, Jakubowicz et al. discussed the multiscale analysis of the reproduction accuracy of jaw geometry obtained using selected orthodontic materials. An accuracy assessment of the model geometry mapping was performed using noncontact systems, including a fringe projection optical 3D scanner, computed tomography, and a focus-variation microscope. Measurements were taken in three modes for comparison, as were the silicone and polyether impression materials. Data analysis showed that deviations were the smallest in the case of silicone and the best fit occurred between the silicone impression and the plaster model. The conducted research confirmed the validity of the assumptions considering the use of multiscale analysis for geometric analysis [12].

To achieve proper esthetics is one of the main challenges associated with using modern dental materials, both in prosthesis and restorative dentistry.

Porojan et al. analyzed the finishing and thermocycling of five resin matrix CAD/CAM ceramic surfaces (a polymer-infiltrated ceramic and four types of nanoparticle-filled resins) to assess their consequences for optical properties. Surface microroughness and optical and hardness evaluations were achieved before and after artificial aging. The authors demonstrated that the optical characteristics of resin matrix ceramics were not significantly modified by thermocycling and thermocycling significantly decreased the microhardness, especially for glazed samples [13].

Unosson et al. described a material made of novel amorphous calcium magnesium fluoride phosphate (ACMFP) core-shell microparticles that may be applied in preventive dentistry for the prevention of caries and the treatment of dentin hypersensitivity. The remineralization and dentin tubule occlusion potential of these particles were evaluated in vitro using acid-etched dentin specimens, and treatment with the ACMFP particles resulted in complete tubule occlusion and dense mineralization layer formation. A cross-sectional evaluation of dentin specimens after treatment formed high aspect ratio fluorapatite crystals and poorly crystalline hydroxyapatite. Therefore, these studied particles provided a single source of readily available calcium, phosphate, and fluoride ions for the potential remineralization of carious lesions, as well as exposing dentin tubules to enable a reduction in hypersensitivity [14].

Finally, this Special Issue also involved research dealing with endodontic materials.

A systematic review by Ferreira et al. aimed to assess the effects of non-thermal plasma treatments on root canal sealers' adhesion to dentin. While there was no consensus about the effect of non-thermal plasma (NTP) on the AH Plus sealer's adhesion to radicular dentin, NTP seemed to positively influence the adhesion ability of BioRoot RCS and Endosequence BC. However, the authors recommended cautiously interpreting these findings due to the scarcity of studies on the topic [15].

Although submissions for this Special Issue have been closed, more in-depth research in the field is being collected for inclusion in a new Special Issue: Dental Materials: Latest Advances and Prospects—Volume III.

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