

# Special Issue on New Techniques, Materials and Technologies in Dentistry

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## 1. Introduction

Dentistry has seen significant technical and technological advances in recent years. These achievements have made it possible to increase the accuracy of diagnoses and treatment plans, improve the predictability and durability of certain treatments, make procedures safer and faster and improve patient experience and acceptance, among other benefits.

The speed at which these advances are developing justifies the publication of this Special Issue helping clinicians to stay up to date on the latest breakthroughs in this field. This Special Issue covers practically all areas of dentistry: implantology, periodontology, operative dentistry, pediatric dentistry, orthodontics, endodontics and oral rehabilitation. Of the 29 papers submitted to this Special Issue, 21 were accepted. In this Editorial, we highlight some of the main conclusions and impacts of these studies.

## 2. New Techniques, Materials and Technologies in Dentistry

All patients are different, so the “one size fits all” approach to prevention, diagnosis and treatment is evolving into a more personalized concept of medicine. Better knowledge of patients’ genetic profile can help guide clinical decisions. An example of this is peri-implantitis, a growing problem that requires better approaches in terms of prevention and treatment. Cardoso et al. [1] carried out a systematic review via a meta-analysis with the aim of evaluating the association between IL-1A, IL-1B and IL-1RN polymorphisms and peri-implantitis. The results showed that patients who have the polymorphic allele at position +3954 of the IL-1B gene have on average almost twice the risk of developing peri-implantitis.

In the area of disease diagnosis, the use of biomarkers can enable timely diagnosis and better monitoring of disease progression and response to treatment. In an innovative study, Salim et al. [2] evaluated salivary interleukin-6, interleukin-1 $\beta$  and C-reactive protein as a diagnostic tool for plaque-induced gingivitis in children. Based on the results, the authors suggest that salivary IL-1 $\beta$  and CRP can be used as potential diagnostic tools to differentiate between moderate and severe plaque-induced gingivitis.

In another field, Raducanu et al. [3] tested the potential use of salivary nitric oxide as a biomarker of bone response following the application of different types of orthodontic appliances. The results showed that metal brackets lead to a significant temporary increase in oral oxidative stress as an adaptive reaction to the presence of foreign bodies in the oral cavity.

Conventional prevention and treatment strategies of caries, periodontal and peri-implant diseases present some limitations, making it necessary to search for alternatives or adjuvants. Probiotics may play an important role in this context. Saiz et al. [4] carried out a systematic review on the use of probiotics in the prevention and treatment of oral diseases, supporting the existing evidence in this regard. In relation to novel therapeutic approaches, the effect of passive ultrasonic irrigation on the elimination of organic remnant tissue from infected, narrow and curved mandibular root canals during their instrumentation was



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evaluated in an *in vitro* study by Alcota et al. [5]. The results suggest that clinicians should incorporate passive ultrasonic irrigation in their regular therapeutic strategy.

Several articles focused on the use of digital technologies in dentistry. This area has seen extremely rapid development in recent years, with a strong impact on clinical practice. For instance, digital technologies bring several advantages, such as reducing errors and complications, faster treatments and faster patient recovery. Wachol et al. [6] evaluated the advantages of dynamic navigation in prosthetic implant treatment in terms of clinical results and salivary pro-inflammatory biomarkers. Dynamic navigation and the application of the flapless technique reduced surgical trauma, leading to a reduced risk of infection, reduced patient discomfort and faster recovery. Implant stability is critical in implant therapy, and there are several devices on the market that allow it to be assessed through resonance frequency analysis and the implant stability coefficient to be calculated. However, there are few studies that have compared the reliability and agreement of different devices. In an *in vitro* study, Blazquez-Hinarejos et al. [7] compared inter- and intra-rater reliability and the agreement level among three of these devices. Rebelo et al. [8] carried out a systematic review on the use of bisphosphonates and implant failure, also identifying other factors such as smoking, poor hygiene, diabetes and hypertension, which increase the risk of failure.

In prosthetic procedures, digital techniques have assumed an increasingly relevant role. Intraoral scanners have gained great clinical acceptance and undergone constant improvements in recent years. Despite this, there are still some relevant issues that need to be investigated. Lee et al. [9] presented a strategy with which operators could acquire more accurate digital impressions in single implant cases in terms of the orientation of the scan body and the scanning method. Until now, stereophotogrammetry has scarcely been investigated in cases of tilted implants. Thome et al. [10] evaluated, in an *in vitro* study, the accuracy of implant-level intraoral scanning and photogrammetry impression techniques in a complete arch with angled and parallel implants. The alteration of the occlusal vertical dimension for prosthetic restoration using a target-tracking system was evaluated by Lee et al. [11]. This new technique seeks to overcome some of the limitations of conventional methods using mechanical articulators. Also, in oral rehabilitation, concerning removable prosthesis, Lee et al. [12] proposed a digital workflow to fabricate complete dentures for edentulous patients using a reversing and superimposing technique. This four-step, completely digital workflow eliminates the need for conventional impressions and reduces patient discomfort and the number of visits.

Another current trend in dentistry is the use of minimally invasive techniques. Manaia et al. [13] presented a case series of patients with pre-eruptive enamel defects in esthetically compromised tooth regions, which were treated with the microabrasion technique. This technique does not require local anesthesia, is less destructive than restorative interventions and allows good esthetic outcomes with no significant postoperative sensitivity. Distinguishing composite remnants from tooth structure after trauma splint removal can be challenging. Magni et al. [14] compared the fluorescence-aided identification technique with conventional light illumination in terms of accuracy and time required for the detection of composite remnants after trauma splint removal.

In terms of new surgical techniques, [15] evaluated the clinical results of the double lateral sliding bridge flap technique with connective tissue graft in the treatment of isolated and multiple gingival recessions. Treating gingival recessions in the mandibular anterior region is a challenge due to anatomical constraints. This study adds more evidence regarding a technique that is still little addressed in the literature.

Five studies in the field of dental materials were published in this Special Issue. The effect of feldspathic thickness on the fluorescence of a variety of resin cements and flowable composites was evaluated in an *in vitro* study by Pereira et al. [16]. Color changes in temporary acetal resins manufactured by a fully computerized design and fabrication process were evaluated *in vivo* by Gómez-Polo et al. [17], with clinically relevant results.

Choudhry et al. [18] tested the antifungal efficacy of sodium perborate and microwave irradiation for the surface disinfection of polymethyl methacrylate polymer, providing a new perspective on the best disinfection strategy for this material.

Also, building a bridge with the digital area, Anes et al. [19] evaluated the retentive forces from removable partial denture clasps manufactured using the digital method. The objective of this study was to evaluate retentive forces and the change in clasps with digitally manufactured different designs over time.

Regarding biomaterials used in bone regeneration and an intersection with the field of new therapeutic approaches, Cenicante et al. [20] carried out a literature review on the use of autogenous dentin in alveolar preservation procedures. In this article, the authors summarize new evidence on the use of autogenous teeth as a biomaterial in ARP, different protocols and future directions.

In terms of translational science, the effect of non-thermal atmospheric pressure plasma on the differentiation potential of human deciduous dental pulp fibroblast-like cells was evaluated by Okuno et al. [21], revealing a potential tool to expand the population of various adult stem cells in vitro for medical applications.

These investigations are united by the common final objective of improving diagnosis accuracy and providing more predictable and long-lasting treatments for patients and with better acceptance. For clinicians, some of these innovative techniques and materials will also make work simpler, faster and more effective.

### 3. Future Perspectives

Some important topics could not be covered in this Special Issue, and others will require further investigation. Technical and technological advances in dentistry will continue to grow at an incredible speed.

Although this Special Issue is now closed, the success it achieved led us to launch a second edition of “New Techniques, Materials and Technologies in Dentistry”. Submissions are now open, so we invite everyone to participate and share their research work.

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