

Special Issue on Materials and Technologies in Oral Research

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1. Summary of the Special Issue Contents

The introduction of novel materials and technologies in oral research has permitted the rapid evolution of dentistry, as confirmed by the increasing number of publications on this topic. The fields of application of novel materials and technologies encompass early diagnosis, the digital planning of treatment, the use of novel devices for the treatment of bacterial and fungal infections, and the use of biomaterials and bioactive compounds for tissue regeneration and teeth replacements.

2. Innovations in Oral Research

The advancements in diagnostics encompass the use of metabolomics in the analysis of human saliva, other oral fluids, and/or tissue biopsies which allow us to differentiate between patients with oral health conditions and those with pathologies (e.g., periodontitis, dental caries, and oral cancers) [1]. One of these is represented by oral candidiasis, which affects a large number of patients wearing dental prosthesis. In fact, the treatment of this condition is based on the use of antifungals, and usually also by the prosthesis replacement. However, a major point of concern is the increasing problem of antibiotics and antifungal resistance, which is developing worldwide. Encouraging results against *Candida albicans*, in vitro, have been shown by the use of a novel device, characterized by the emission of complex magnetic fields [2].

In the case of dental demineralization, the use of an ozone generator showed the ability to stop the progression of early childhood caries (ECC) with a concomitant decrease of dental hypersensitivity [3]. Another important advancement is the use of bioactive materials in the field of biomedical tissue engineering. One of these is represented by Biodentine™ (BD) (Septodont, Paris, France), a tricalcium silicate cement that showed a stimulatory effect on the odonto/steogenic capacity of cultured human dental pulp stem hDPSCs cells. These properties makes of this material, an encouraging candidate for dentine regeneration [4].

In the case of the diagnosis of carcinoma, the use of intraoral ultrasonography could be a valid tool for the evaluation of depth of invasion (DOI) and tumor thickness (TT) [5], and the results appear to be highly correlated with those of histologic analysis, which, since 30 years ago, represents a milestone in oral research [6]. Another important tool for the diagnosis and pre-surgical planning is cone-beam computed tomography (CBCT). This allows an optimal visualization of the anatomical structures in order to reduce the risk of nerve injuries [7] during the surgery. Moreover, in the case of large bony defects, the CBCT scans allow us to evaluate the dimensions of the defects and to use the data obtained in the production of 3D bone block substitutes [8,9]. CBCT also allows us to perform follow-ups to the surgery, including many years later [9].



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In the last few years, the introduction of selective laser melting in implant dentistry has allowed the production of novel titanium surfaces characterized by a tridimensional (3D) framework and able to promote osteogenesis and reduce bacterial interactions [10].

Moreover, the testing of dental implants on polyurethane blocks allows us to obtain a large amount of information about the insertion and removal torque, as well as the primary stability of fixtures, without the necessity of performing tests on animals and eliminating the risk of bias, due to the high variability of natural bone samples [11].

Conflicts of Interest: The authors declare no conflict of interest.

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