

# Journal of Oral Science & Rehabilitation

Journal for periodontology, implant dentistry,  
dental prosthodontics and maxillofacial surgery





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# Importance of periimplant soft tissue

In Lately, the importance of periimplant tissue has become increasingly evident in implant dentistry. Until the early 2000s, researchers and clinicians focused exclusively on the interaction between the bone and implant. Thereafter, the main focus became esthetics and the key role of the muco-prosthetic framework in relation to it. During the subsequent period, clinicians have focused their attention on the soft-tissue volume increment around implant-supported restorations, to achieve a more stable and esthetic result.

It is useless to talk about the importance of keratinized tissue or an adequate amount of connective tissue to improve the emergence profile of an implant-supported restoration in the esthetic zone. However, often soft-tissue grafts were done following the notion of the more, the better and the scientifically unconfirmed guarantee of a “periodontal-like” attachment between the abutment and the tissue, whatever material the abutment was made of. This was done without considering the high risk of creating a pocket all around the prosthesis.

Very recently, for this reason, attention in implant dentistry was focused mostly on the interaction between the abutment and the connective tissue, and the greatest attention was centered on the abutment's ability to adhere to soft tissue, to “fibro-integrate”. This is a dramatic change of perspective because it implies a shift of attention from the bulk material, or the macroscopic geometry of the abutment, to its external microcharacteristics: cleanliness, electric properties, microtexture, wettability.

Maybe the near future will bring us a material (or configuration) that is truly integrable with soft-tissue.

**Dr. Luigi Canullo**  
Associate editor

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The Journal of Oral Science & Rehabilitation publishes original and high quality research and clinical papers in the fields of periodontology, implant dentistry, prosthodontics and maxillofacial surgery. Priority is given to papers focusing on clinical techniques and with a direct impact on clinical decision-making and outcomes in the above-mentioned fields. Furthermore,

book reviews, summaries and abstracts of scientific meetings are published in the journal.

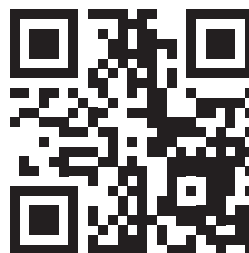
Papers submitted to the *Journal of Oral Science & Rehabilitation* are subject to rigorous double-blind peer review. Papers are initially screened for relevance to the scope of the journal, as well as for scientific content and quality. Once accepted, the manuscript is sent to the relevant associate editors and reviewers of the journal for peer review. It is then returned to the author for revision and thereafter submitted for copy editing. The decision of the Editor-in-Chief is made after the review process and is considered final.

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## Information

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# Trends in clinical trials on bone regeneration in dentistry—towards an innovative development in dental implant treatment

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## **Abstract**

### **Objective**

The aim of this study was to assess the global trends in clinical trials on bone regeneration in dental implantology.

### **Materials and methods**

An electronic search for clinical studies was conducted via the ClinicalTrials.gov database. The search strat-

egy used the following terms: “bone regeneration” AND “oral,” and “bone regeneration” AND “dental”. Furthermore, the selected clinical studies were resurveyed using “bone regeneration” AND “dental implant,” and “bone regeneration” AND “oral” AND “implant” for further analysis.

## **Results**

We selected 181 clinical studies related to the field of bone regeneration in dentistry from ClinicalTrials.gov. The selected studies were conducted in 27 countries from 2001 to the present, and the total number of studies has been increasing since 2011. Analysis of the clinical stage revealed a higher ratio (55.6%) of early study phases (early phase 1, phase 1, phase 1/2 and phase 2), but the periodontal field of application appeared more mature, having more phase 4 trials. Regarding the bone regeneration methods for dental implantology, the major technique examined in interventional clinical trials was guided bone regeneration, followed by alveolar ridge preservation, and sinus floor elevation. Various grafting materials, such as autografts, allografts, xenografts, alloplasts and barrier membranes, were examined to determine clinical efficacy. Combinations of these materials were more frequently used.

## **Conclusion**

Our analysis of the clinical trials registered on the ClinicalTrials.gov database indicated the global clinical trends in bone regeneration techniques in dentistry. The randomized clinical trials of guided bone regeneration technique using combination of different bone grafts materials is conducted the most in dental implantology. These findings could be useful for development of an innovative therapy for bone regeneration.

**Keywords:** Bone regeneration; clinical trials; ClinicalTrials.gov; dental implants; regenerative medicine.



## Introduction

A clinical trial is a study in humans that assesses safety and effectiveness of a new treatment. It is essential to develop new treatment for therapeutic use. It is clearly crucial to conduct clinical trials and log the relevant information on a database for development of novel medicine. During the 1990s, clinical trial registration was strongly promoted in biomedical research, with the aim of documenting the existence of all trials and eliminating publication bias. The International Committee of Medical Journal Editors required registration of all trials starting enrollment after July 1, 2005, and of ongoing clinical trials that began enrolling patients before that date.<sup>1</sup> The World Health Organization declared support for clinical trial registration and in 2006 launched the WHO International Clinical Trials Registry Platform (ICTRP)<sup>2</sup>. The Clinical Trials Search Portal provides access to a central database containing the trial registration datasets. Currently, there are 17 data providers of the ICTRP Search Portal, including ClinicalTrials.gov, the EU Clinical Trials Register, the ISRCTN registry, the Japan Primary Registries Network, the Australian New Zealand Clinical Trials Registry, the Brazilian Clinical Trials Registry and the Chinese Clinical Trial Register ([https://www.who.int/ictip/search/data\\_providers/en/](https://www.who.int/ictip/search/data_providers/en/)).

ClinicalTrials.gov is a database of privately and publicly funded clinical studies conducted around the world and is the world's largest clinical trial registration database. It is hosted by the National Library of Medicine at the National Institutes of Health in collaboration with the U.S. Food and Drug Administration. It explores 321,732 research studies in 209 countries and provides information about target diseases, sponsors, principal investigators, planned schedules and protocols, and enrollment. Moreover, since the database provides comprehensive information on the content of the planned clinical trials, one can perform various targeted analyses by extracting and tagging attribute data from each clinical study plan.<sup>3</sup>

Alveolar bone loss is often caused by trauma, pathology, chronic or acute infections, severe periodontitis, and loss of mechanical function after tooth extraction or tooth loss.<sup>4</sup> Since the overall alveolar changes after tooth extraction may compromise prosthodontic re-

habilitation using tooth-supported fixed or removable prostheses, as well as implant-supported prostheses, adequate quality and quantity of bone regeneration are required, especially in the field of implant dentistry.<sup>5</sup> Various materials and surgical treatments have been developed, but a definitive bone regeneration technique is not yet established. To the best of our knowledge, there are no scientific reports that have comprehensively analyzed and examined the clinical research trends in bone regeneration in dental implant treatment.

In this article, the focus was on bone regeneration for an innovative development in dental implant treatment based on the clinical trials registration database. Since ClinicalTrials.gov is the largest clinical trial registration database in the world and is one of the best designed database providers for aggregation and analysis,<sup>6</sup> we chose it to obtain the data for analysis. In this concise review, we first surveyed country, start year and clinical stage of clinical studies on bone regeneration in dentistry to identify global translational trends and followed this with analysis of the details about clinical trials in dental implantology. We aimed to establish global translational trends, which have thus far been difficult to interpret. The results of this study could be useful to learn of the development of new techniques in dental implantology.

## Materials and methods

In this review, an extensive electronic search for clinical studies was conducted via the ClinicalTrials.gov database. The last search was updated on Nov. 11, 2019. Medical Subject Headings, combined with free words, was used to identify the search terms. The following search terms: "bone regeneration" AND "oral," and "bone regeneration" AND "dental" were used for analysis by country, start year and clinical stage of the clinical studies. In this survey, we excluded duplicate studies and in vitro or preclinical studies using human subjects. In clinical stage analysis, the studies that were described as "not applicable" in the database were excluded. Furthermore, the selected clinical studies were resurveyed using "bone regeneration" AND "dental implant," and "bone regeneration" AND "oral" AND "implant." We excluded studies that were not related to bone regeneration by reading the descriptions of the individual studies.