

Implants infections, a current challenge for medicine and dentistry.

Infecciones de implantes, un desafío actual para la medicina y la odontología.

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According to figures from the FDA and to Medtech European estimates, there are approximately 500,000 different medical devices in the market. Some numbers estimate that more than one million cardiovascular devices are implanted per year, ten million dental implant procedures are performed, and ten million women carry breast implants.¹

Among the complications associated with the use of biomaterials, infections are by far the most common. A large part of these devices is installed invasively in the human body, and in many cases they are in contact with mucous membranes, skin and even the bloodstream, which favors the entry of microorganisms. Dental implants are not an exception; in fact surgical procedures within the mouth are classified as type 2 according to the Centers for Disease Control and Prevention guidelines, in which the early complications of dental implants are associated with surgical trauma, characteristics of bone tissue, systemic factors, implant properties, and the healing capacity of patients. While late complications are associated with biofilm formation, titanium allergy and occlusal overload.

The infection of peri-implant tissues is defined in the new classification of periodontal and peri-implant conditions as a pathological entity associated with plaque that accumulates in the tissues around the implant with peri-implant mucosa inflammation and subsequent loss of support tissues.²

For a long time, in the dental implant context, this pathology was defined as a “disease of the future”, with an unclear prevalence, between 4% and 45%, according to Derks *et al.*,³ due to a lack of consensus in the definition of peri-implantitis, and in the factors that must be considered in its diagnosis. However, today it is known that far from being a disease of the future, peri-implantitis is a current issue that many dental care professionals are bound to face, therefore the number of scientific publications has notoriously increased. As an example of this, during the year 2000 only 26 articles under the term “peri-implantitis” were identified in Pubmed, while 192 articles were found in 2012. In terms of prevalence, a recent study of Kordbacheh Changi *et al.*,⁴ that included 6129 implants from 2127 patients, approximately a third part of the patients and a fifth of the total implants presented peri-implantitis.

Even though the available evidence regarding this disease has considerably increased, there are still several gaps to fill. Many studies suggest an increased risk of peri-implantitis in patients with a history of

periodontitis, deficient plaque control skills, and no regular support therapy after implantation.

On the other hand, although smoking and diabetes are important factors associated with risk and rate of progression in periodontitis, no conclusive evidence about their role as potential risk factors for peri-implantitis has been found.

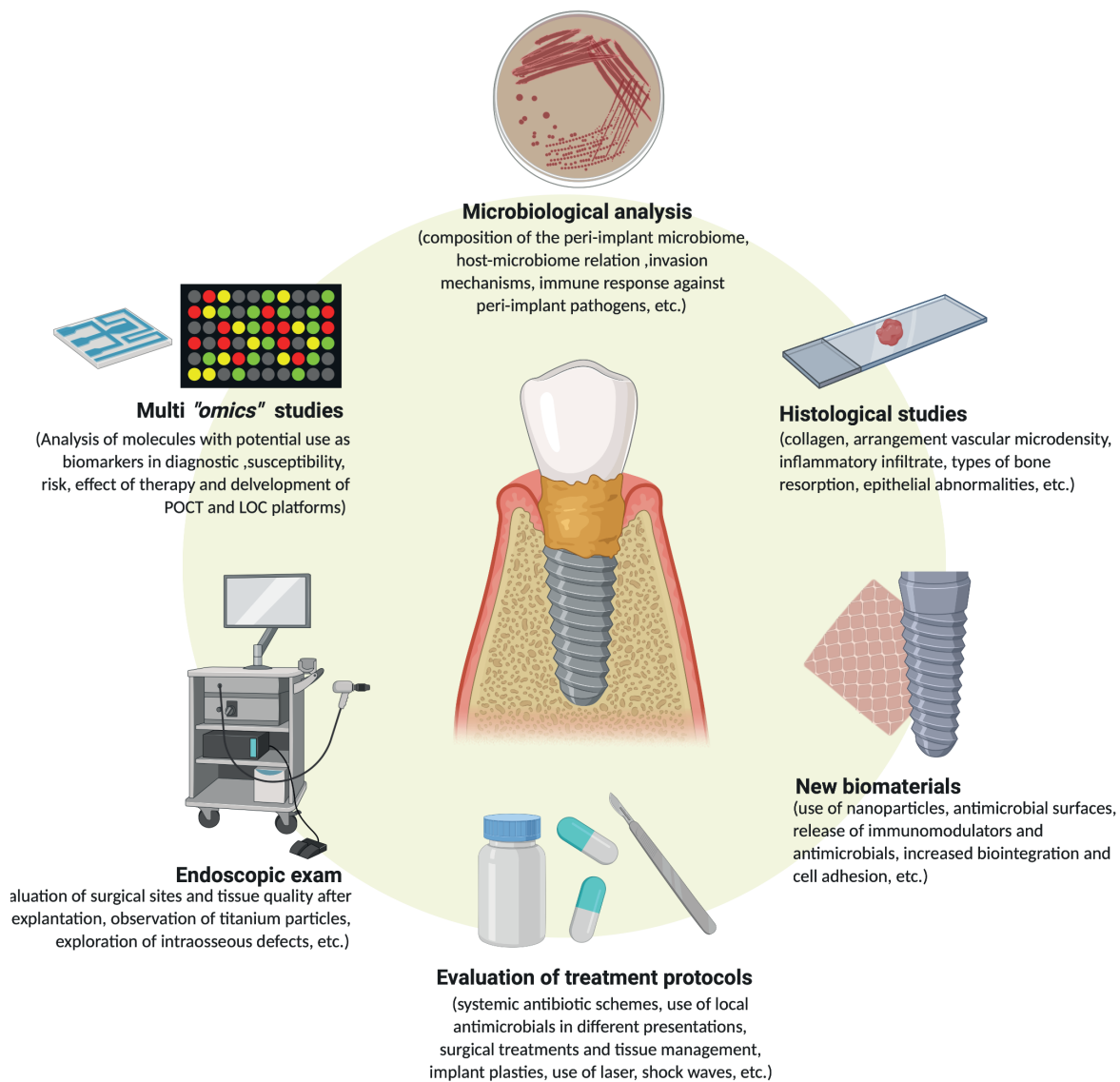
Due to the presence of biomaterials and the characteristics present in the peri-implant tissue, many of the universally accepted concepts of periodontitis (considered for a long time a similar disease) cannot be

extrapolated to the management of implant infections.

Although it is currently known that the microbiology of peri-implantitis is different from that of periodontitis, and in peri-implantitis inflammatory lesions are histo-logically more extensive than in periodontitis, the conditions that facilitate the progression from peri-implant mucositis to peri-implantitis are not yet completely understood.

Additionally, there is still limited evidence linking peri-implantitis with other factors such as the presence of subgingival cement, quantity of keratinized mucosa and position of the implant.²

Figure 1. Fields of study and research in peri-implant diseases.



Currently the areas of study of peri-implantitis go beyond obtaining epidemiological data and seek a full understanding of the disease from the study of its etiological factors (microbiology), the analysis of the histological characteristics of hard and soft tissues, the search for biomarkers and development of POCT and LOC platforms, intraoperative endoscopic evaluation, the development of biomaterials with better clinical behavior and less susceptible to being colonized by bacteria, and the development and standardization of both surgical and pharmacological treatment protocols, either local or systemic.

Because of all the above mentioned factors, not only there is the necessity for new research on the real prevalence of this pathology based on standard criteria for its diagnosis, but research regarding the development of treatment protocols with proven effectiveness are also needed, as well as new diagnostic tools based on biomarkers and precision medicine.

With this, it would be possible to evaluate the risk and prognosis of dental implants before the pathology appears and to apply preventive measures before implant placement.

For example, optimizing the conditions for future peri-implant tissues, modulating the patient's habits and considering systemic conditions that could affect survival and/or favor the development of infections.

In this context, the use of implants in an area as complex as the oral cavity, requires collaborative, multicentered and interdisciplinary research considering different areas like histopathology, microbiology, biomarker analysis, endoscopically assisted examinations, evaluation of treatments, new biomaterials and multi "omics" studies (Figure 1), so that preventive strategies can be designed.

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