## LAB®-TEST 1: PERI-IMPLANTITIS AND BACTERIOLOGICAL ANALYSIS

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Peri-implantitis is a destructive inflammatory process that affects the tissues around osseointegrated implants, resulting in the formation of a peri-implant pocket and loss of the supporting bony (1).

Peri-implantitis are observed in 12-43% of the implants (2). The most evident clinical signs are hyperplasia of the soft tissues, suppuration, gradual bone loss and progressive mobility of the implant.

One of the causes of the peri-implantitis is the bacterial colonization of implant surfaces.

Lipopolysaccharides from the cell walls of periodontal pathogens induce the release by monocytes and macrophages of pro-inflammatory mediators like cytokines and tumor necrosis factor alpha.

These mediators stimulate fibroblasts to produce prostaglandins and metalloproteinases, which determine the decomposition of alveolar bone and extracellular matrix destruction. In these cases, the formation of a granulation tissue can replace the bone gradually resorbed.

The progression of the disease frequently leads to osteomyelitis followed by the loss of the implant after few weeks.

However, the disease progression is influenced by the host response to bacterial toxins. This response depends by different factors like environmental (poor oral hygiene, smoking, stress), systemic (diabetes, osteoporosis) and genetic (polymorphisms in genes encoding molecules of the host immune defense).

Microbiota associated to healthy peri-implant tissue

is composed by gram-positive bacteria like *Streptococcus mitis*, *Streptococcus sanguis and Streptococcus oralis*. These microrganisms create a series of prior conditions for the adhesion of periodontal pathogens, being able to induce the development of peri-implantitis (3).

The microbiota associated with failure of the implants is very similar to that found in periodontal disease and is characterized by high counts and proportions of gramnegative anaerobic bacteria.

The principal microrganisms involved in periimplantitis are members of the red complex species (*Porphyromonas gingivalis, Treponema denticola and Tannerella forsythia*) and orange complex species (*Fusobacterium sp. and Prevotella intermedia*), as defined by Socransky et al. (4). Hultin et al (5) recovered high count of *Actinobacillus actinomycetemcomitans* and *Aggregatibacter actinomycetemcomitans* around implants with peri-implantitis.

Staphylococcus aureus, enteric rods and Candida albicans, are also associated with peri-implant infections (6-8).

Alcoforado et al. (9) identified a diseased implant microflora consisting of *Campylobacter rectus*, *Fusobacterium* species, *Prevotella intermedia* and *Candida albicans*.

Leonhardt et al. (10) found that peri-implantitis sites are invaded by *Porphyromonas gingivalis*, *Porphyromonas intermedia*, and *Actinobacillus actinomycetemcomitans*. These pathogens were observed in ITI® and Brånemark fixtures at 3 to 6 months following implant placement (11).

Key words: Peri-implantitis, microbiota, periodontal diseases, inflammation, bone, resorption

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Fig. 1. Bacterial analysis in PCR- Real Time

Patients with a past history of periodontal disease tend to have a high prevalence of anaerobic periodontal pathogens even after several months the exposure to the infection (12).

Some studies have shown an association between peri-implantitis and periodontitis, probably due to the transmission of pathogenic bacteria from the teeth to the implant (13, 14).

For this reason is important that the clinician knows the status of the periodontal microflora of the patient before implant placement and continue to monitoring the tissue around the implant (13).

Our laboratory (LAB<sup>®</sup> s.r.l., Codigoro, Ferrara, Italy) has developed a test that detects the most frequent bacterial species involved in the onset of peri-implantitis (*Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis, Tannerella forsythia, Treponema denticola,*).

Periodontal disease progression depends by the quantity and composition of bacterial flora in the gingival sulcus.

The LAB-test performed in real time PCR (Fig. 1) assess the bacterial load of the four species considered more suitable for discriminating between healthy and affected by peri-implantitis.

The results provide an infection profile of the patient useful to improve diagnosis and planning a preventive treatment aiming at reducing the subgingival bacterial load that avoids the loss of the implant.

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