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**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 microorganisms 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 gram-negative anaerobic bacteria.

The principal microorganisms involved in peri-implantitis 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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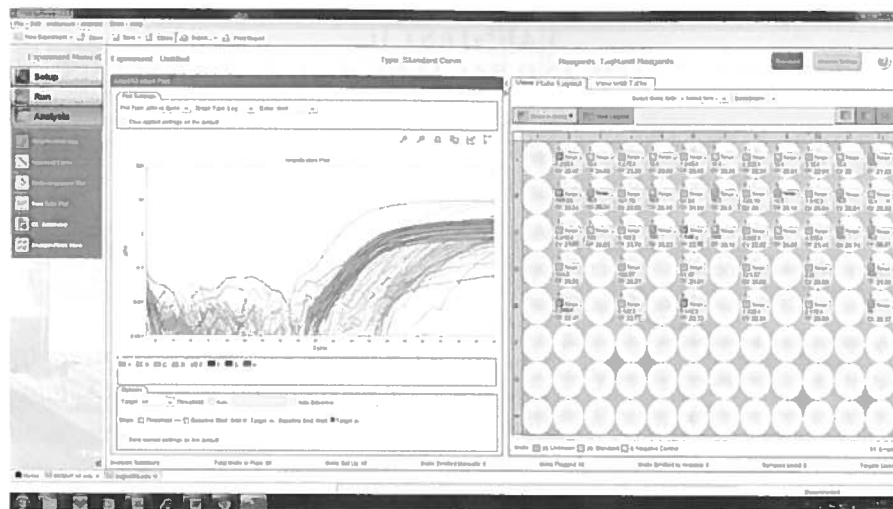


Fig. 1. Bacterial analysis in PCR- Real Time

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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#### REFERENCES

1. Mombelli A. Prevention and therapy of periimplant infections. In Proceedings of the 3rd European Workshop on Periodontology. Lang NP, Karring T, Lindhe J, eds. Quintessence Books. Berlin, 1999; 281–303.
2. Zitzmann NU, Berglundh T. Definition and prevalence of peri-implant diseases. J Clin Periodontol 2008; 35:286–91.
3. Heuer W, Elter C, Demling A, Neumann A, Suerbaum S, Hannig M, Heidenblut T, Bach FW, Stiesch-Scholz M. Analysis of early biofilm formation on oral implants in man. J Oral Rehabil 2007; 34:377–82.
4. Socransky SS, Haffajee AD, Cugini MA, Smith C, Kent RL, Jr. Microbial complexes in subgingival plaque. J Clin Periodontol 1998; 25:134–44.
5. Hultin M, Gustafsson A, Hallstrom H, Johansson LA, Ekfeldt A, Klinge B. Microbiological findings and host response in patients with peri-implantitis. Clin Oral Implants Res 2002; 13:349–58.
6. Botero JE, Gonzalez AM, Mercado RA, Olave G, Contreras A. Subgingival microbiota in peri-implant mucosa lesions and adjacent teeth in partially edentulous patients. J Periodontol 2005; 76:1490–5.
7. Kronstrom M, Svenson B, Hellman M, Persson GR. Early implant failures in patients treated with Branemark System titanium dental implants: a retrospective study. Int J Oral Maxillofac Implants 2001; 16:201–7.

8. Rosenberg ES, Torosian JP, Slots J. Microbial differences in 2 clinically distinct types of failures of osseointegrated implants. *Clin Oral Implants Res* 1991; 2:135-44.
9. Alcoforado GA, Rams TE, Feik D, Slots J. Microbial aspects of failing osseointegrated dental implants in humans. *J Parodontol* 1991; 10:11-8.
10. Leonhardt A, Adolfsson B, Lekholm U, Wikstrom M, Dahlen G. A longitudinal microbiological study on osseointegrated titanium implants in partially edentulous patients. *Clin Oral Implants Res* 1993; 4:113-20.
11. Mombelli A, Marxer M, Gaberthuel T, Grunder U, Lang NP. The microbiota of osseointegrated implants in patients with a history of periodontal disease. *J Clin Periodontol* 1995; 22:124-30.
12. Apse P, Ellen RP, Overall CM, Zarb GA. Microbiota and crevicular fluid collagenase activity in the osseointegrated dental implant sulcus: a comparison of sites in edentulous and partially edentulous patients. *J Periodontal Res* 1989; 24:96-105.
13. Quirynen M, van Steenberghe D, Jacobs R, Schotte A, Darius P. The reliability of pocket probing around screw-type implants. *Clin Oral Implants Res* 1991; 2:186-92.
14. Karoussis IK, Muller S, Salvi GE, Heitz-Mayfield LJ, Bragger U, Lang NP. Association between periodontal and peri-implant conditions: a 10-year prospective study. *Clin Oral Implants Res* 2004; 15:1-7.



### Volume 10 No. 1 (S2), January - April, 2012 - CONTENTS

✓ G. Brunelli, F. Carinci, I. Zollino, V. Candotto, A. Scarano, D. Lauritano. Peri-Implantitis: A case report and literature review.....	1
✓ G. Brunelli, F. Carinci, I. Zollino, V. Candotto, A. Scarano, D. Lauritano. SEM evaluation of 10 infected implants retrieved from man.....	7
✓ A. Scarano, B. Palmieri, G.L. Bertuzzi, A. Di Cristinzi, F. Carinci, D. Lauritano. Perioral rejuvenation and lip augmentation with hyaluronic acid.....	13
✓ A. Scarano, G. Murmura, F. Carinci, D. Lauritano. Immediately loaded small-diameter dental implants: evaluation of retention, stability and comfort for the edentulous patient.....	19
✓ A. Scarano, D. D'Andria, G. Fippi, F. Di Carlo, F. Carinci, D. Lauritano. Treatment of perioral rhytides with voltaic air dermoabrasion.....	25
✓ A. Scarano, G. Iezzi, A. Di Cristinzi, G.L. Bertuzzi, F. Carinci, D. Lauritano. Full-facial rejuvenation with autologous platelet-derived growth factors.....	31
✓ S. Fanali, F. Carinci, I. Zollino, C. Brugnati, D. Lauritano. One-piece implants installed in restored mandible: a retrospective study.....	37
✓ A. Scarano, G. Murmura, L. Artese, F. Carinci, D. Lauritano. Schwannoma of the posterior tongue in a thirteen-year old child.	43
✓ A. Scarano, B. Sinjari, D. Di Iorio, G. Murmura, F. Carinci, D. Lauritano. Surface analysis of failed oral titanium implants after irradiated with ErCR:YSGG 2780 laser.....	49
✓ S. Fanali, F. Carinci, I. Zollino, C. Brugnati, D. Lauritano. A Retrospective study on 83 one-piece implants installed in resorbed maxillae.....	55
✓ A. Scarano, A. Quaranta, B. Feragalli, A. Di Cristinzi, F. Carinci, D. Lauritano. Haemostasis control in dental extractions with calcium sulphate: a case series.....	59
✓ V. Sollazzo, F. Carinci, D. Lauritano. The biophysical stimulation of osteogenesis: A Review.....	65
✓ C. Riberti, F. Carinci, I. Pezzini, L. Moretti, M. Candiani, V. Loconte, I. Zollino, C. Bleve, A. Franchella, G. Brunelli. Versajet hydroscaapel: a new surgical approach for the treatment of giant congenital melanocytic nevus in the first month of life...	71
✓ A. Franchella, S. Pellegrinelli, F. Carinci, I. Zollino, G. Carnevali, V. Candotto, S. Franchella, G. Denotti, V. Piras, G. Brunelli. Thyroglossal duct cysts: A retrospective study.....	75
✓ A. Franchella, S. Pellegrinelli, F. Carinci, I. Zollino, G. Carnevali, V. Candotto, S. Franchella, G. Denotti, V. Piras, G. Brunelli. Infantile hemangiomas of the face: A case series evaluation.....	79
✓ A. Franchella, S. Pellegrinelli, F. Carinci, I. Zollino, G. Carnevali, V. Candotto, S. Franchella, G. Denotti, V. Piras, G. Brunelli. Head and neck pyogenic granulomas in children.....	83
✓ A. Franchella, S. Pellegrinelli, F. Carinci, I. Zollino, G. Carnevali, V. Candotto, S. Franchella, G. Denotti, V. Piras, G. Brunelli. Dermoid cysts: a case series of pediatric patients.....	87
✓ F. Carinci, A. Girardi, A. Palmieri, M. Martinelli, L. Scapoli, A. Avantiaggiato, G.M. Nardi, D. Lauritano. Lab-test 1: peri-implantitis and bacteriological test.....	91
✓ F. Carinci, A. Girardi, A. Palmieri, M. Martinelli, L. Scapoli, A. Avantiaggiato, G.M. Nardi, D. Lauritano. Lab-test 2: microflora and periodontal disease.....	95
✓ F. Carinci, A. Girardi, A. Palmieri, M. Martinelli, L. Scapoli, A. Avantiaggiato, G.M. Nardi, D. Lauritano. Lab-test 3: genetic susceptibility in periodontal disease.....	99