

The road to accelerated osseointegration

The very latest breakthrough in dental technology

What does LIFENOVA Biomedical offer?

A breakthrough dental implant process with a proprietary advanced surface:

- > Based on a well established advanced and clean technology.
- > Non-coating surface free of any contamination risk.
- > Shorter patient treatment times than with currently available implants
- > A thoroughly tested product both "in vitro" and "in vivo".

**A new world of outstanding
surfaces in a new generation
of dental implants !!!**



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Titanium based dental implants are the preferred solution for lost teeth as long-term support for crowns, dentures, and bridges. Nevertheless, many challenges lay ahead yet if implant based solutions will receive an even more widespread acceptance. Among them, **shorter patient treatment times** and the **possibility of using them in cases of poor bone quality** are most relevant.

Both challenges are very related to the bone integration of the implants. That is because a good fixation is mandatory for a good transmission of the chewing forces. At this point, the interactions taking place at the interface between the living tissue and the implant surface from the very moment of its insertion plays a key role. Hereafter the paramount importance of the implant surface.

Company background

INASMET, a Technology Research Centre in the field of materials (www.inasmet.es) in close collaboration with the local medical community have invested many efforts to investigate the mechanisms behind the interaction between the implant surface and the living tissue.



As a result, **LIFENOVA Biomedical, S.A.** was set up in 2001 as a partnership between the medical & engineering community, and has since focused on the development of new implant surfaces with superior osseointegration properties. This continued effort has led to a proprietary implant surface with outstanding characteristics, which have been solidly tested.

Product description

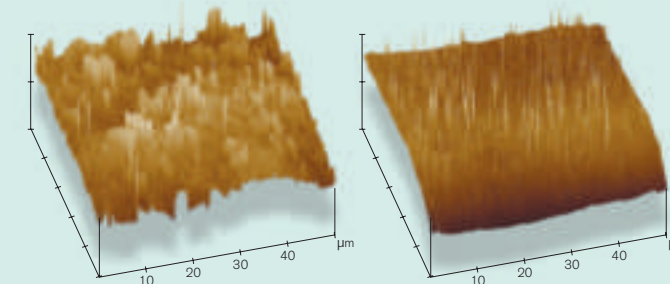
The new proprietary surface solution is based on ion implantation technology, which offers a product:

- > Based on a well established and tested technology.
- > Clean contaminant-free vacuum based technology.
- > An innovative non-coating surface, compatible with current implant designs and sterilization methods.
- > A well defined and tested surface meeting the more demanding patients' needs of shorter treatment times, showing outstanding results on poor bone quality cases.

A real breakthrough to accelerated osseointegration !!!

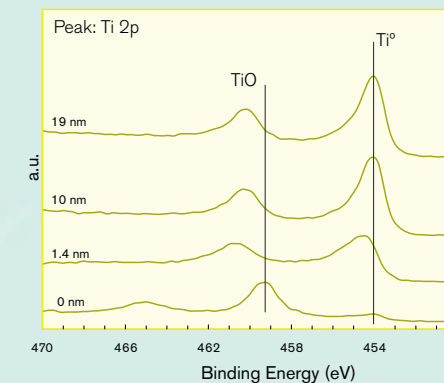
Scientific background

It is well known that implant performance is ruled mainly by its surface properties in terms of topography and physical-chemical properties. So far, developed and commercially available surfaces have optimised micro scale topography; now an optimised **nano scale topography** is offered.



APM (Atomic Force Microscopy) images of treated (left) vs untreated (right) titanium surfaces.

The surface chemistry has also been thoroughly studied in its structure and composition. This promotes and accelerates bone formation and growth around the implant.

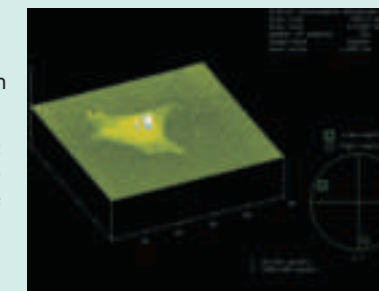


XPS (X-Ray Photoelectron Spectroscopy) spectra of a Ti surface.

The **outstanding properties** of this new surface has been thoroughly demonstrated on:

- > In vitro human osteoblast cell culture tests.
- > In vitro human osteoblast proliferation tests

Scientific reference:
-Effects of ion implantation on the biocompatibility and osseointegration properties of dental implants. I.Braceras, J.I.Álava, M.Brizueta, N.Garagorri, A. García-Luis, M.A.de Maeztu, J.I.Oñate and J.L.Viviente. 17th European Conference on Biomaterials, 11-14 Sept 2002, Barcelona, Spain.
-Bone adhesion on ion implanted titanium alloy. I.Braceras, J.I.Oñate, L.Goikoetxea, J.L.Viviente, J.I.Álava and M.A.de Maeztu. 13th Int. Conf. On SMMIB, 21-26 Sept.2003, San Antonio, TX-USA.

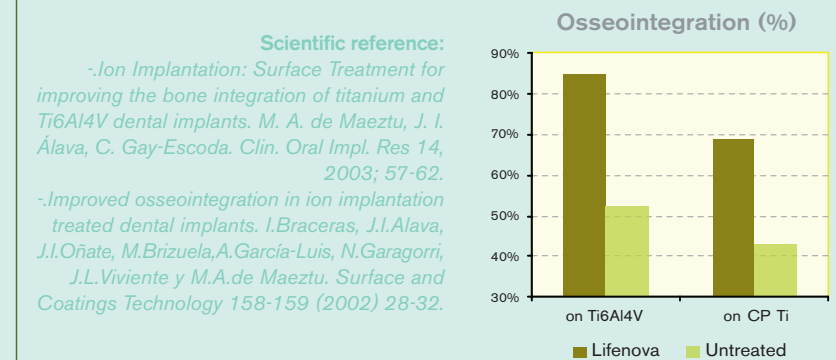


Morphology of attached osteoblast showing different levels of polarization and reaction of the surface due to the treatment. The distribution of charges produces more spread and much more flattened star shaped cells.

Histological studies on New Zealand white rabbits (See table enclosed).

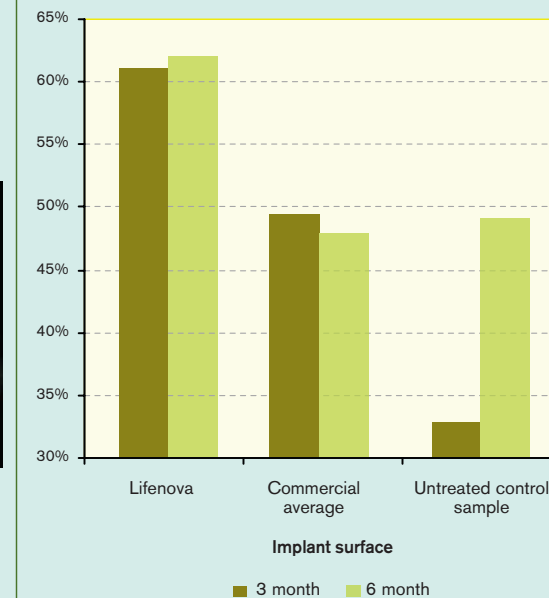


Even at early stages a trabecular bone migration effect towards the treated surface can be observed.



Histological studies on Beagle dogs against a number of commercially available implant surfaces and time related evolution (See table enclosed).

Osseointegration evolution - SEM evaluation



Sample for histological study.

In vivo tests on human patients: under progress.