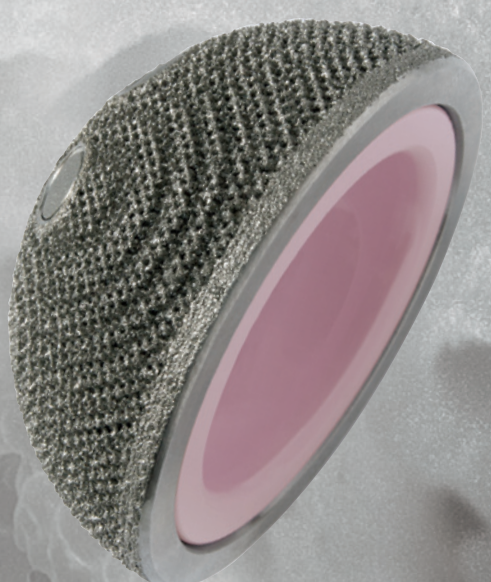
Trabecular *Titanium*™

Naturae imitatio



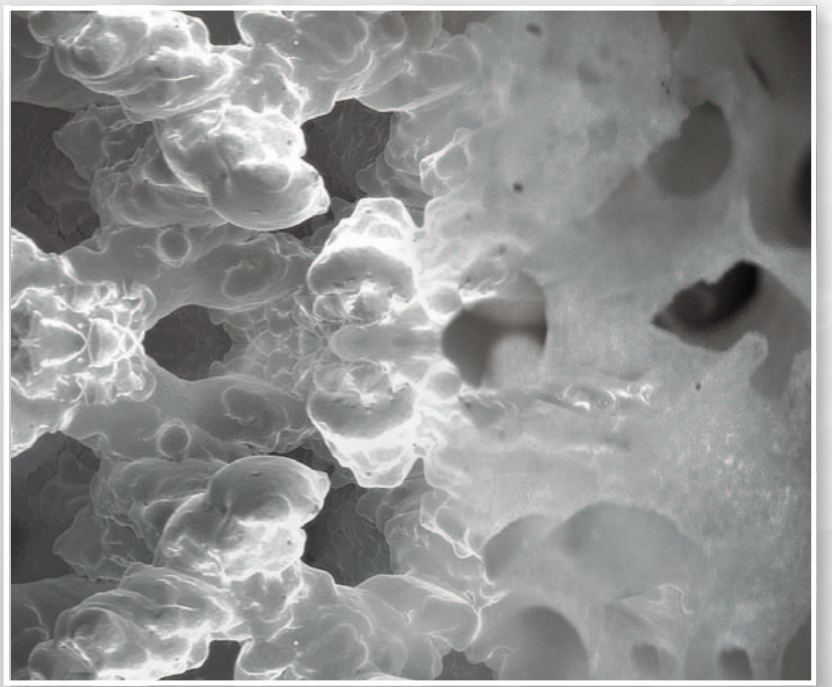
Lima Corporate

The structure that imitates bone

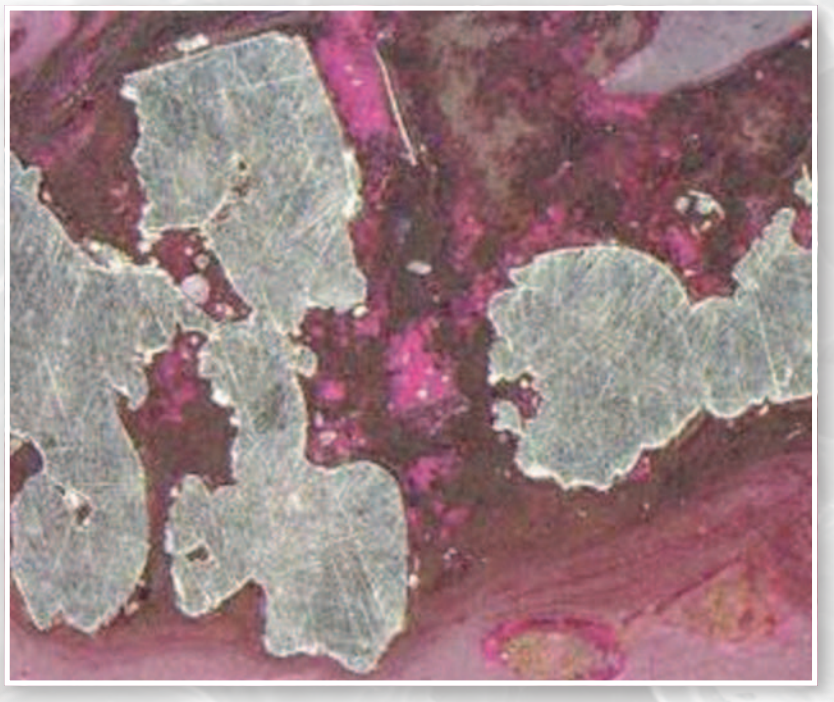
Trabecular Titanium

Trabecular Titanium ensures the best interface between bone and implant. With the Trabecular Titanium technology it is possible to obtain titanium components without coatings thanks to a perfectly controlled porosity.

The 3D structure with its hexagonal cells imitates bone morphology creating an ideal space for the cellular colonization and revascularization of neoformed bone tissue.



Trabecular Titanium reproduces the morphology of the trabecular bone

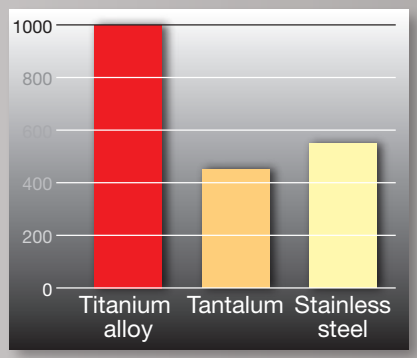


The neoformed osseous tissue completely surrounds the implant without discontinuity or fibrous tissue

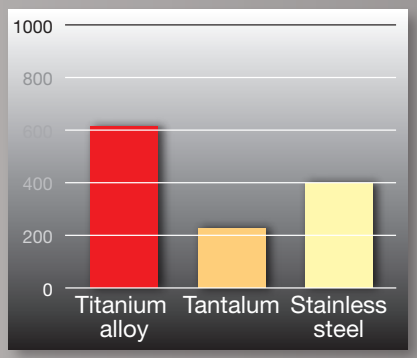
The Material: Titanium

We have chosen an extremely biocompatible material without compromise **[1-2]** with extraordinary mechanical characteristics.

Tensile strength [MPa]

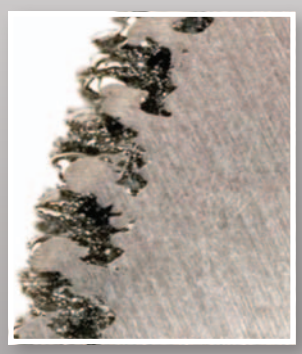


Fatigue resistance [MPa]

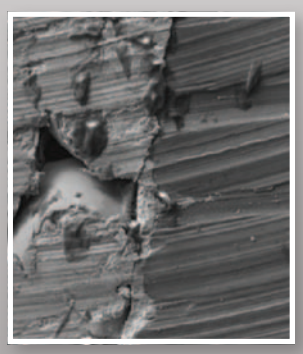


The Trabecular Titanium structure **is not a coating**

Overcoming the coating concept, there is no interface between the bulk structure and the porous trabecular surface.



Continuous Trabecular Titanium trabecular structure

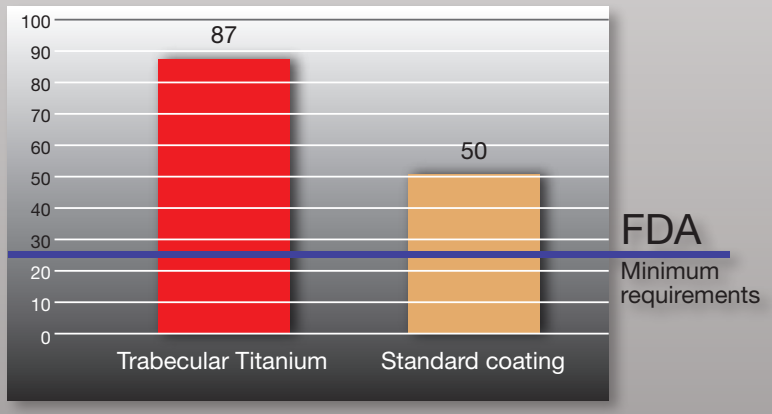


Material discontinuity in a standard coating

There is no risk of detachement

Trabecula breakage occurs above the ultimate tensile strenght of titanium as demonstrated by the adhesion tests **[3]**.

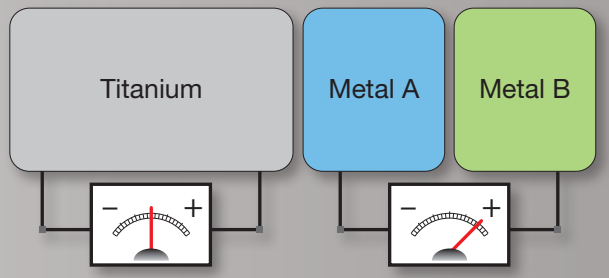
Adhesive resistance [MPa]



Adhesive resistance exceeds standard coating by 75% and safety values imposed by FDA by 400%.

No risk of galvanic corrosion

generated when materials with different electronegativity are in contact **[4]**.

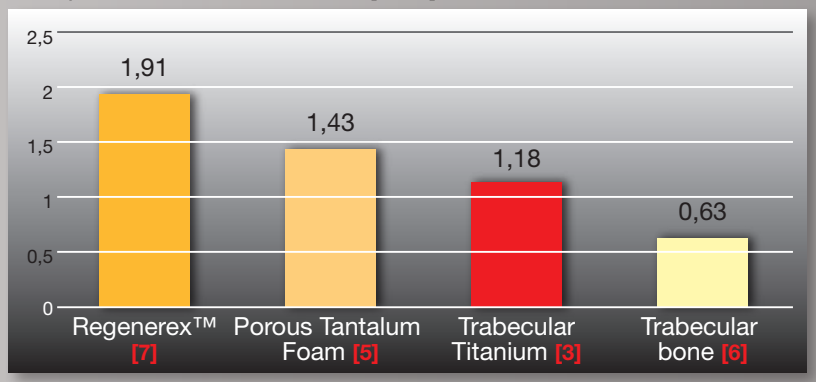


Volta effect in couplings between metals with differing electronegative potential.

Perfectly controlled **porosity**

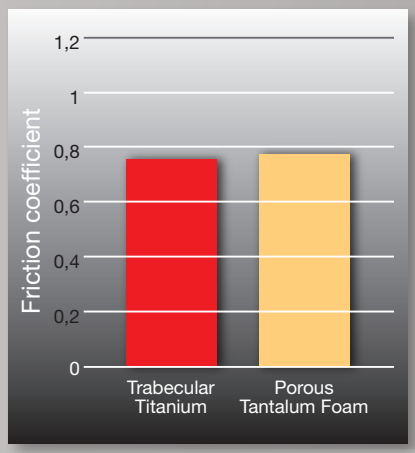
Respect for the bone biomechanics, thanks to an elastic module very similar to that of the trabecular bone.
TT re-establishes physiological load transfer avoiding damage to the bone.

Compressive elastic module [GPa]

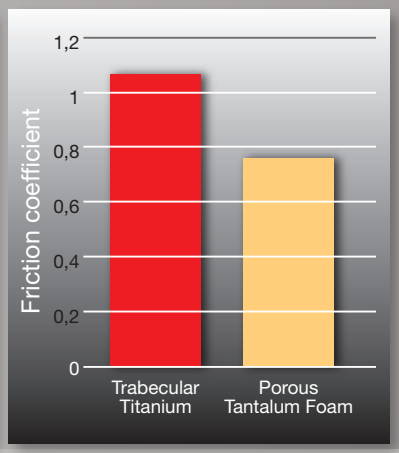


TT has an extremely high friction coefficient at contact with the cancellous bone, which maximizes primary stability of the acetabular components and enhances bone integration.

Friction on cortical bone



Friction on cancellous bone

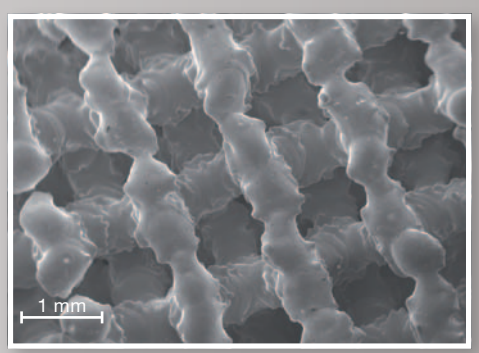


An optimal pore size plays a critical role in osteogenic processes and improves the quality of the bone formed in contact with the implant [8,9,10].

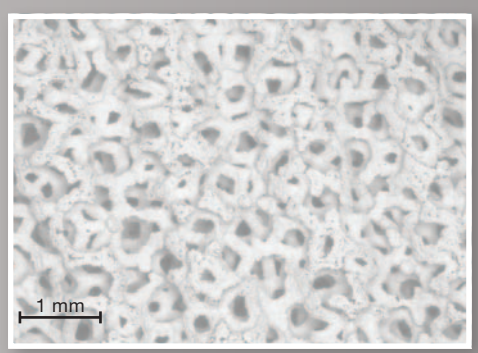
TT pore diameter = 640 µm

Comparative studies on trabecular structures with pores of different diameters (300, 400, 500, 600 and 1,000 µm) show how, after 20 days, the most rapid and effective osteointegration takes place inside the 600 µm canals [9].

The uniformity of the structure ensures that the chosen characteristics will be replicated over the entire surface, cell by cell.



Trabecular Titanium structural uniformity

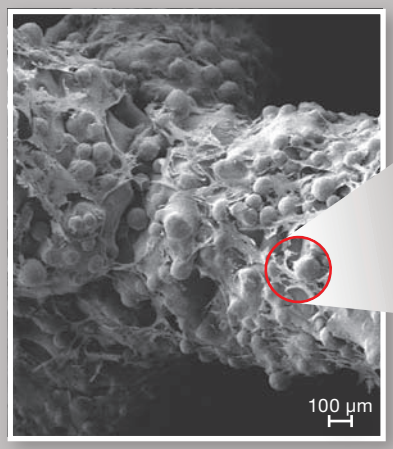


Other trabecular structures on the market

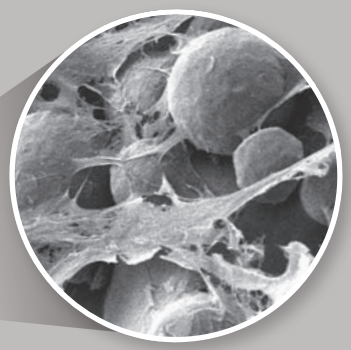
Osteointegration
demonstrated *in vitro* and *in vivo*

Gene expression analysis on steoblast-like cells demostrate that TT favors osteogenesis processes, inhibits osteoclastogenesis and degradation of the bone matrix. *

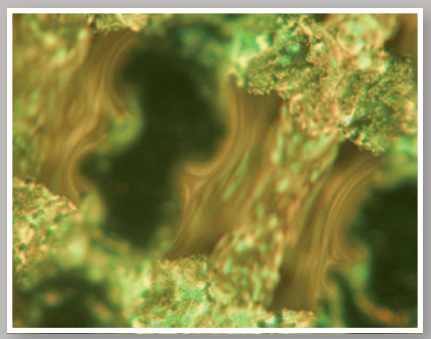
In vitro studies show that trabecular structure is completely colonized by osteoblasts after 22 days in dynamic culture conditions. **



Osteoblasts on the TT.
SEM 50x scaffold

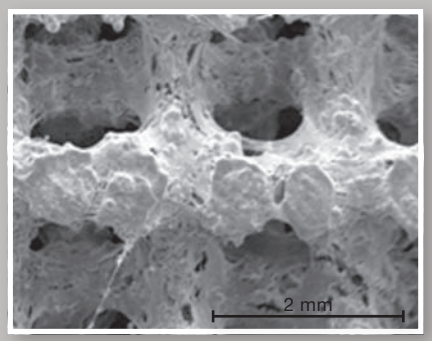


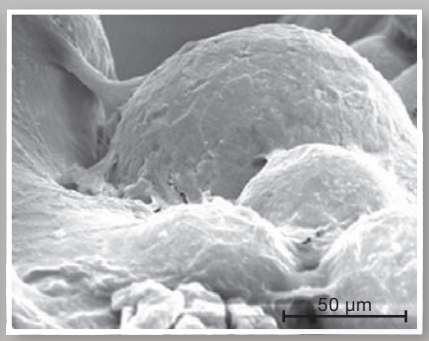
Detail of osteoblasts in the extracellular matrix. SEM 250x



Expression of collagen I (green)

TT constitutes a proper scaffold to enhance human **adipose stem cells** adhesion, proliferation and differentiation into osteoblastic cells. **

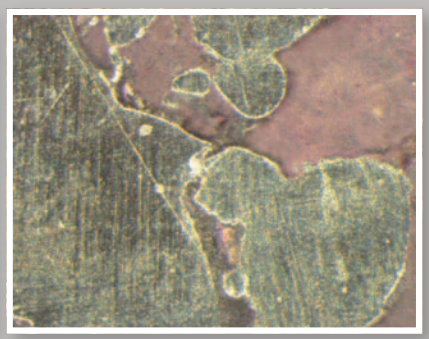




Colonization of TT pores with human stem cells differentiated into osteoblasts and deposition of bone matrix. SEM 16x, 550x

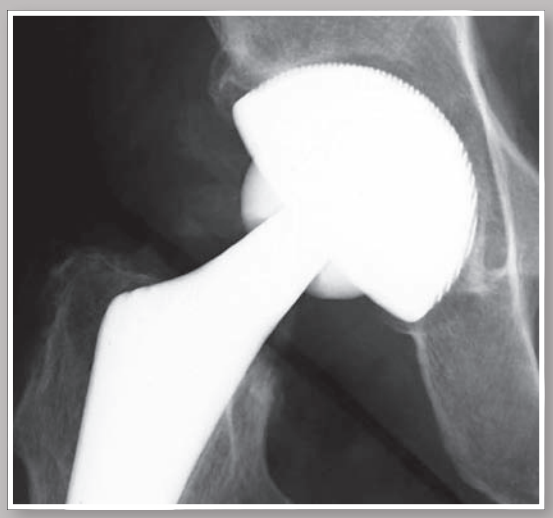
In vivo studies demonstrate excellent osteointegration with neoformation of lamellar bone and a 95% Bone Implant Contact (BIC) after only 26 week in a rabbit model. ***

Neoformation of lamellar bone after 26 week. Stereomicr. 50x



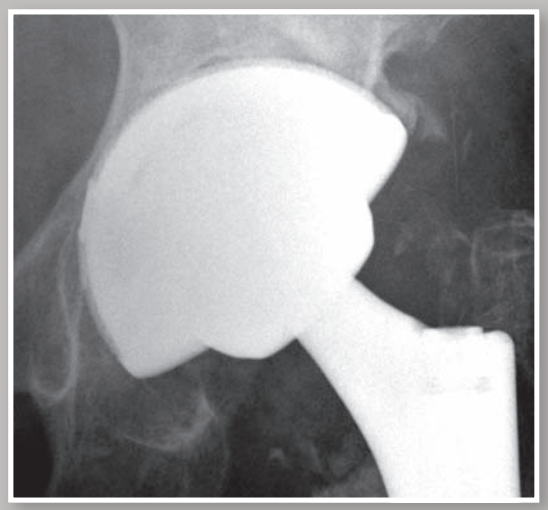
Continual interface between bone and TT with no fibrous tissue. Stereomicr. 60x

Case Histories



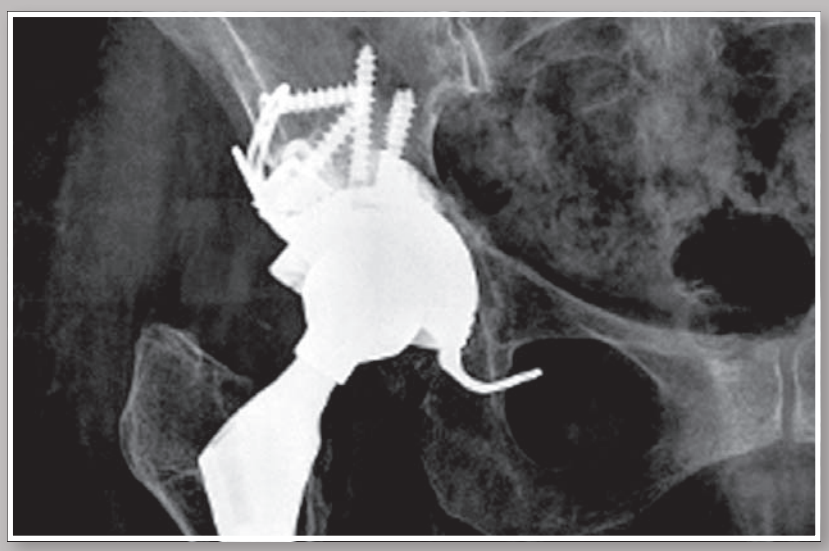
Primary Implant

DELTA-TT implant in a case of coxarthrosis



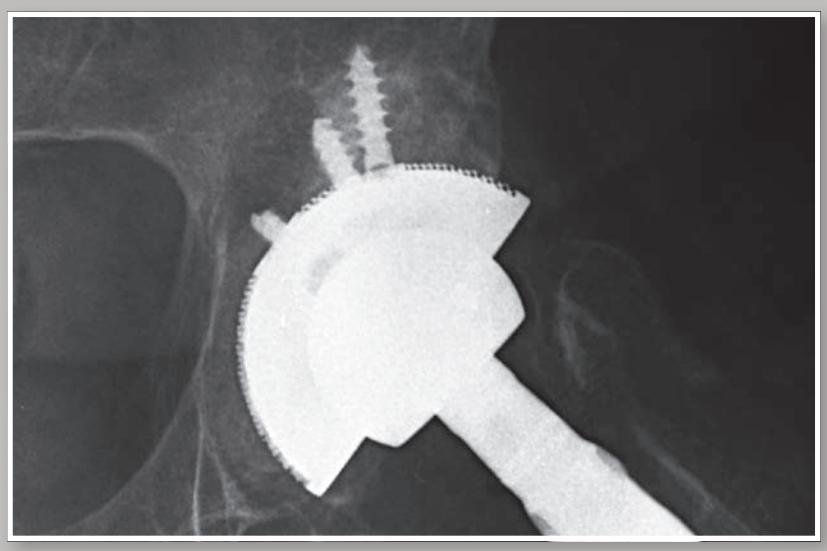
Revision

DELTA-TT implant with ceramic liner



Revision

DELTA-REVISION.
Acetabular cavitary defect corrected
with TT HEMISPHERIC MODULE.
Coverage corrected with +20° angled spacer

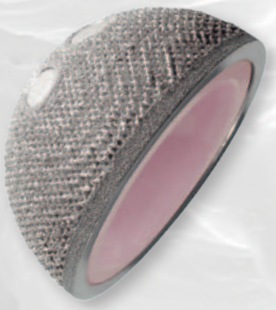


Revision

DELTA-TT implant with ceramic liner

Meets with the excellence
of the Delta Acetabular System

TT technology is used to produce acetabular components, where the geometry is studied to adapt to the differing clinical indications ensuring maximum stability and ideal recovery of the anatomy.



TT

Primary implants and revisions

ONE-TT

Dysplasia and revisions

REVISION-TT

Severe revisions

REVISION-TT

Severe revisions
with bone defects

Hemispheric TT module
REVISION-TT

Liner Biolox® Delta
angled spacer

Hemispheric TT module
REVISION-TT

Polyethylene

Hemispheric TT module
REVISION-TT

MET-MET 42 mm

Hemispheric TT module
REVISION-TT

Dual mobility 42 mm

The hemispheric modules are assembled onto the DELTA-ONE-TT and DELTA-REVISION-TT cups

Bibliography

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* Maxillofaccial and Orthopaedic Basic Science Lab (Consorzio Interuniversitario per le Biotecnologie), Università di Ferrara.
** Centro Interdipartimentale di Ingegnereia Tissutale (CIT), Università di Pavia.
*** Laboratorio Biolab Spa in collaborazione con Università di Trieste.

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Lima Corporate

Lima-Lto spa
Via Nazionale, 52
33038 Villanova di San Daniele
Udine - Italy
Tel.: +39 0432 945511
Fax: +39 0432 945585
E-mail: info@lima.it

Lima Implantes slu
Entenza 95 - 3° - 1ª
08015 Barcelona - Spain
Tel.: +34 93 228 9240
Fax: +34 93 426 1603
E-mail: lima@limaimplantes.com

Lima France sas
Les Espaces de la Sainte Baume
Parc d'Activité de Gemenos - Bât.A5
30 Avenue du château de Jouques
13420 Gemenos - France
Tel.: +33 (0) 4 42 01 63 12
Fax: +33 (0) 4 42 04 17 25
E-mail: info@limafrance.com

Lima O.I. d.o.o.
Maksimirska, 103
10000 Zagreb - Croatia
Tel.: +385 1 23 617 40
Fax: +385 1 23 617 45
E-mail: lima-oi@lima-oi.hr

Lima Switzerland sa
Binkestrasse 49
CH-6343 Rotkreuz - Zug
Switzerland
Tel: +41 (0) 41 747 06 60
Fax: +41 (0) 41 747 06 69
E-mail: info@lima-switzerland.ch

Lima Japan kk
Koshin Building 8F.
4-5-1 Nishi-shinjyuku, Shinjyuku,
Tokyo 160-0023 - Japan
Tel.: +81 3 5350 0755
Fax: +81 3 5350 0766

Lima CZ sro
Do Zahrádek I., 157/5
155 21 Praha 5 - Zličín - Czech Republic
Tel.: +420 222 720 011
Fax: +420 222 723 568
E-mail: info@limacz.cz

Lima Deutschland GmbH
Kapstadtring 10
22297 Hamburg - Germany
Tel.: +49 40 6378 4642
Fax: +49 40 6378 4649
E-mail: info@lima-deutschland.com

Lima Austria GmbH
Ignaz-Köck-Strasse 10, Top 3.2
A-1210 Wien - Austria
T: +43 1 27 12 469
F: +43 1 27 12 469 100
E-mail: office@lima-austria.at

Lima SK s.r.o.
Zvolenská cesta 14
97405 Banská Bystrica - Slovakia
Tel.: +421 484 161 133
Fax.: +421 484 161 138
E-mail: info@lima-sk.sk

Lima Netherlands B.V.
Bergweg 153 A
Zeist - The Netherlands
Tel.: +3130 6912088
Fax: +31 30 6919736

Lima Implantes Portugal Lda
Rua Antonio Albino Machado 35 I
1600-256 Lisboa - Portugal

Hit Medica srl
Via san Gregorio 11/13
47900 Rimini - Italy
Tel.: +39 0541 781422/781672
Fax: +39 0541 781053
E-mail: info@hitmedica.it
www.hitmedica.it

www.lima.it