



# EU FP7 ViNaT PROJECT



2012, JUNE 6-7, MOSCOW

MISIS

2<sup>nd</sup> General Meeting

**Requirements to material for dental implants**

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**Timplant**

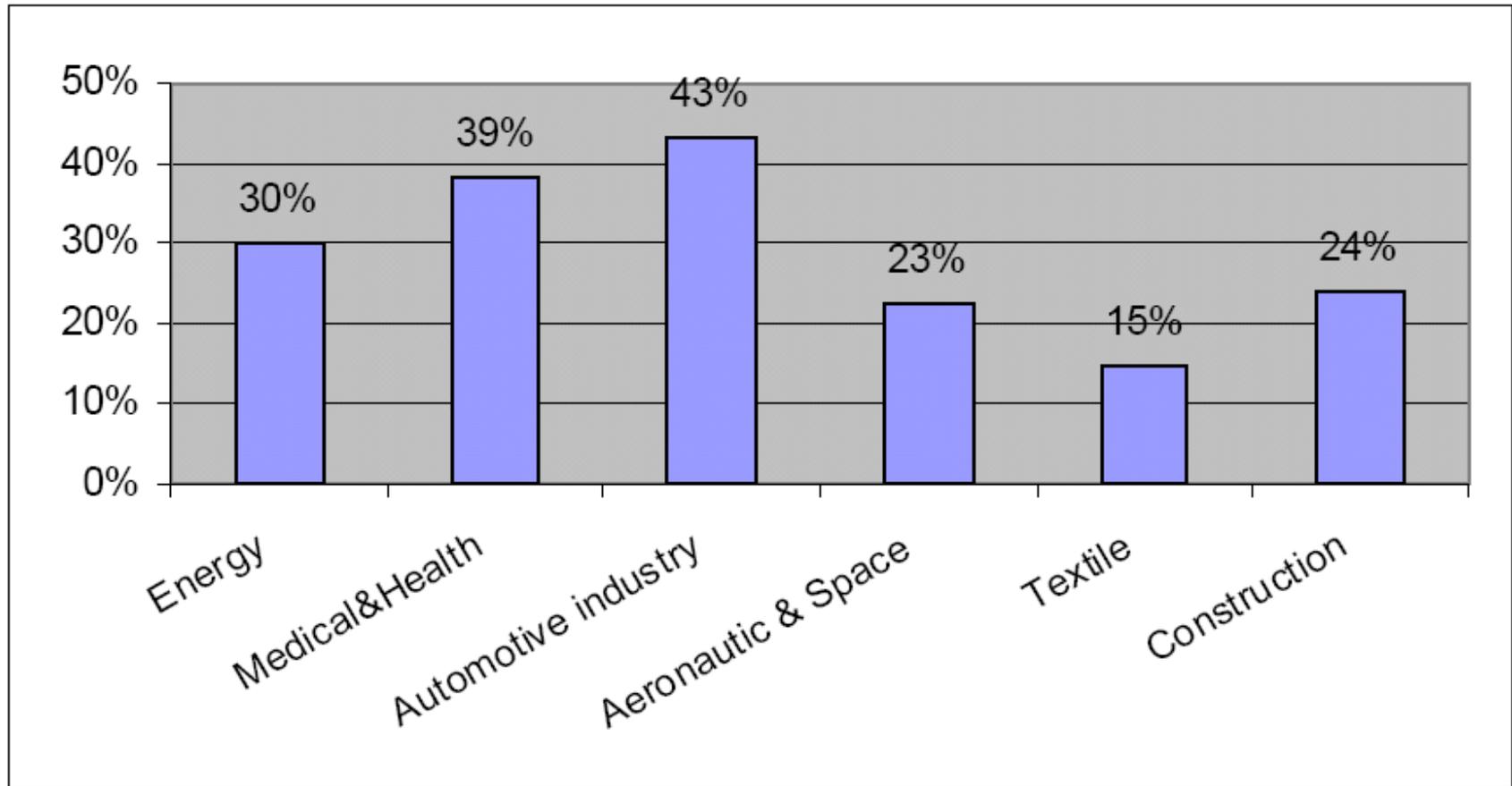
dental implants

**Timplant**

dental implants



# Supposed application of nanomaterials in branch



# Property Requirements for Dental Implants Material

- metallic or nonmetallic (ceramic) or combination (ceramic is complicated in machining and higher fracture disposition)
- structure – nanostructure (evidently higher adherence of osteoblastic cells)
- bio-inert or biocompatibility or bio-active surface (the best of is bioactive)
- not contains neither even potentially toxic nor carcinogenic nor allergenic additives
- optimal specific strength properties (it depend of what kind of implants will produce)
- lower modulus elasticity
- minimized coefficient of current conduction and heat conduction
- availability, shape, diameter, length, roundness, straightness, machinability (CNC)
- material shall be free of injurious external and internal imperfections
- acceptable price

# Optimal values for CNC fabrication

- Tensile Strength – 1250 MPa and higher – for dental implants under diameter 2,4 mm
- Elongation – 10+5%
- Reduction – 30+5%
- Elasticity modulus - optimal 30-50 GPa
- Rod, bar – diameter 4-5 mm
- Straightness -+2mm/m
- Diameter tolerance h9 (0-0,03mm)
- Length of bar 2-3 m

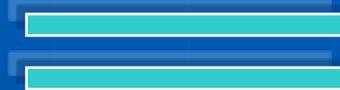
# STRENGTH

of flexure



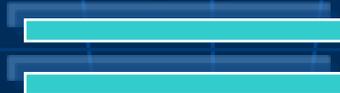
ø2,4  
T.S. 1250MPa  
nTi

12 mm



# AREA

of intraosseal part



ø3,5  
T.S. 550MPa  
cpTi

10 mm

# CNC Production facility



# Production reviewing



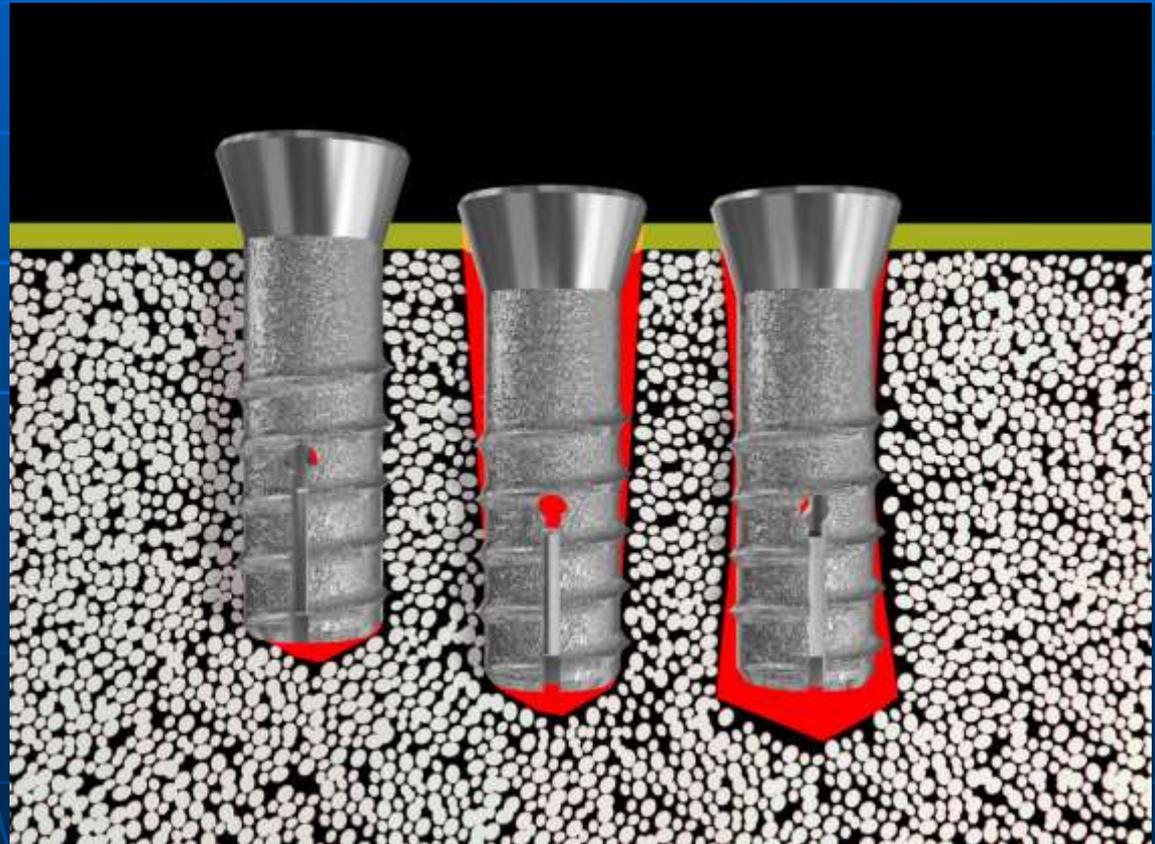
**Current check – manual optical equipment**



**Final check – automatic optical equipment**

# Apically Expandable dental implant Autofix

**cpTi Gr. 3**



# Cells occupation on the different surface

After 72 hours

<b>MATERIAL</b>	<b>surface</b>	<b>finishing</b>	<b>% of occupied surface</b>
ASTM F67-00	A1	Turning	<b>49,07</b>
ASTM F67-00	A2	Turning & plasma	<b>53,11</b>
ASTM F67-00	A3	Turning & HF-etching	<b>53,01</b>
ASTM F67-00	A4	Turning & HF & plasma	<b>54,16</b>
NANOMATERIAL	N1	Turning	<b>68,76</b>
NANOMATERIAL	N2	Turning & plasma	<b>65,41</b>
NANOMATERIAL	N3	Turning & HF-etching	<b>87,22</b>
NANOMATERIAL	N4	Turning & HF & plasma	<b>86,96</b>

Cell line L929

# Worlds manufacturers of dental implant systems and components 201

Database Osseosource updated 2012  
 Only implants system producers aprox. 138  
 Total products 1822



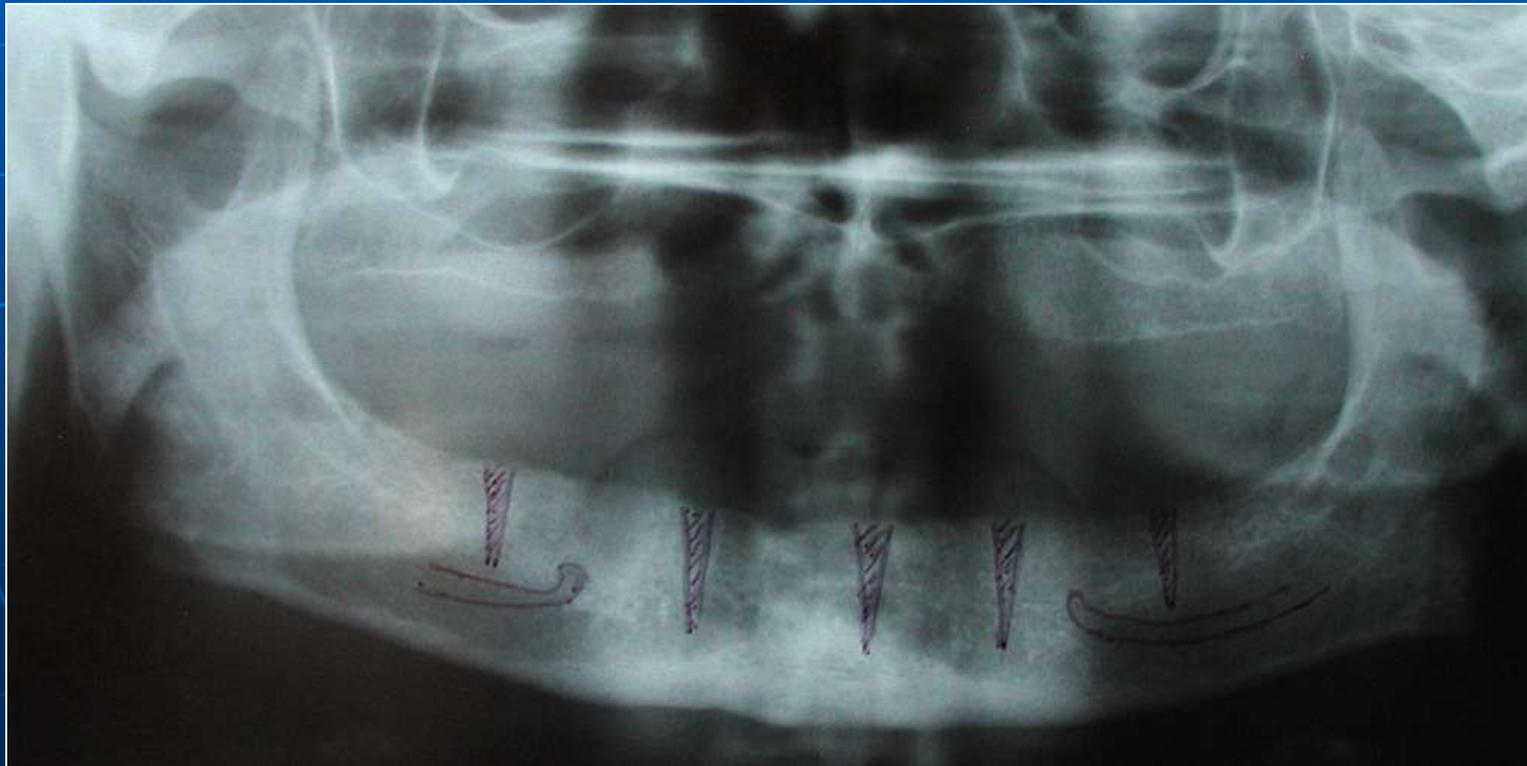
implant type	total
External Hex	142
External Octagon	2
Internal 120 degrees notches (Tri-Lobe)	12
Internal 60 degrees tubes	7
Internal Hex	136
Internal Octagon	40
Internal Pentagon	2
Internal Twelveagon	1
Morse Taper	49
Not known	19
One piece (no connector)	44
Other	10

country	total
Argentina	1
Austria	1
Brazil	6
Canada	5
Czech Republic	3
Finland	2
France	6
Germany	26
Hungary	2
Israel	5
Italy	22
Japan	4
Liechtenstein	1
Poland	1
South Africa	1
South Korea	7
Spain	9
Sweden	3
Switzerland	5
The Netherlands	2
United Kingdom	3
USA	23

# Case Report

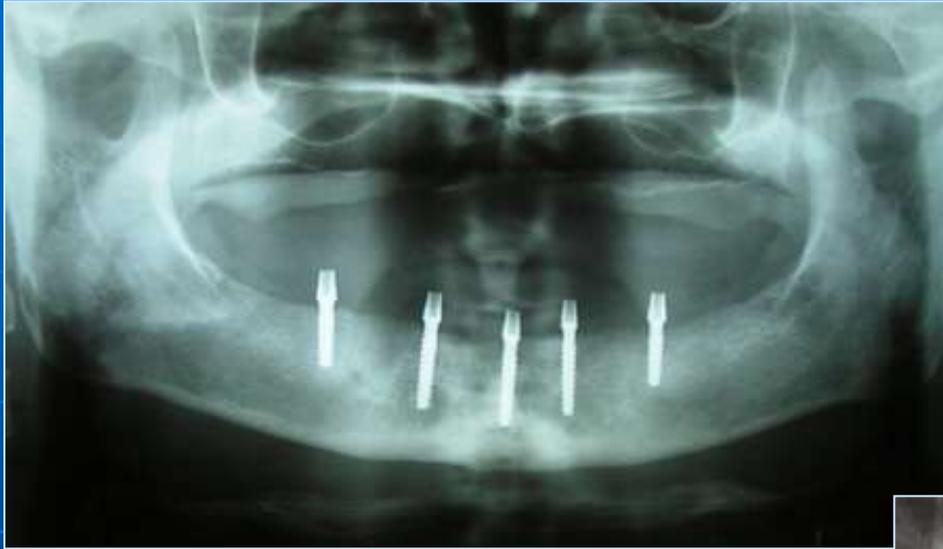
## Immediately loaded implants – plan of implantation

- Totální defekt DČ - pacientka r. 1947
- Dva roky HTP a DTP.
- Implantace 5 ks Nanoimplantů - v místě 36,46 – A10, 33, 43, 41 – A12.
- Ihned otisky. Provizorní suprastruktura do 2 hodin od operace.
- Po 3 měsících otisky na definitivní plošný metalkeramický most.



# Case Report

## Immediately loaded implants



Three years loaded classical implants – comparative x-ray illustrate good size of bone

X-ray after inserting



# Case Report

## Immediately loaded implants



# Case Report

## Immediately loaded implants



Impression caps

Impression



# Case Report

## Immediately loaded implants



Temporary bridge



# Case Report

Immediately loaded implants – final situation



# Thank you for your attention



[www.timplant.cz](http://www.timplant.cz)