CWM
Cowellmedi Co., Ltd.
www. cowellmedi.com

For Simpler, Speedier, Safer & Superior Implant Dentistry

Cowellmedi Implant System

Cowellmedi, the Pioneers in Dental Implant & rhBMP-2

INNO Implant System®

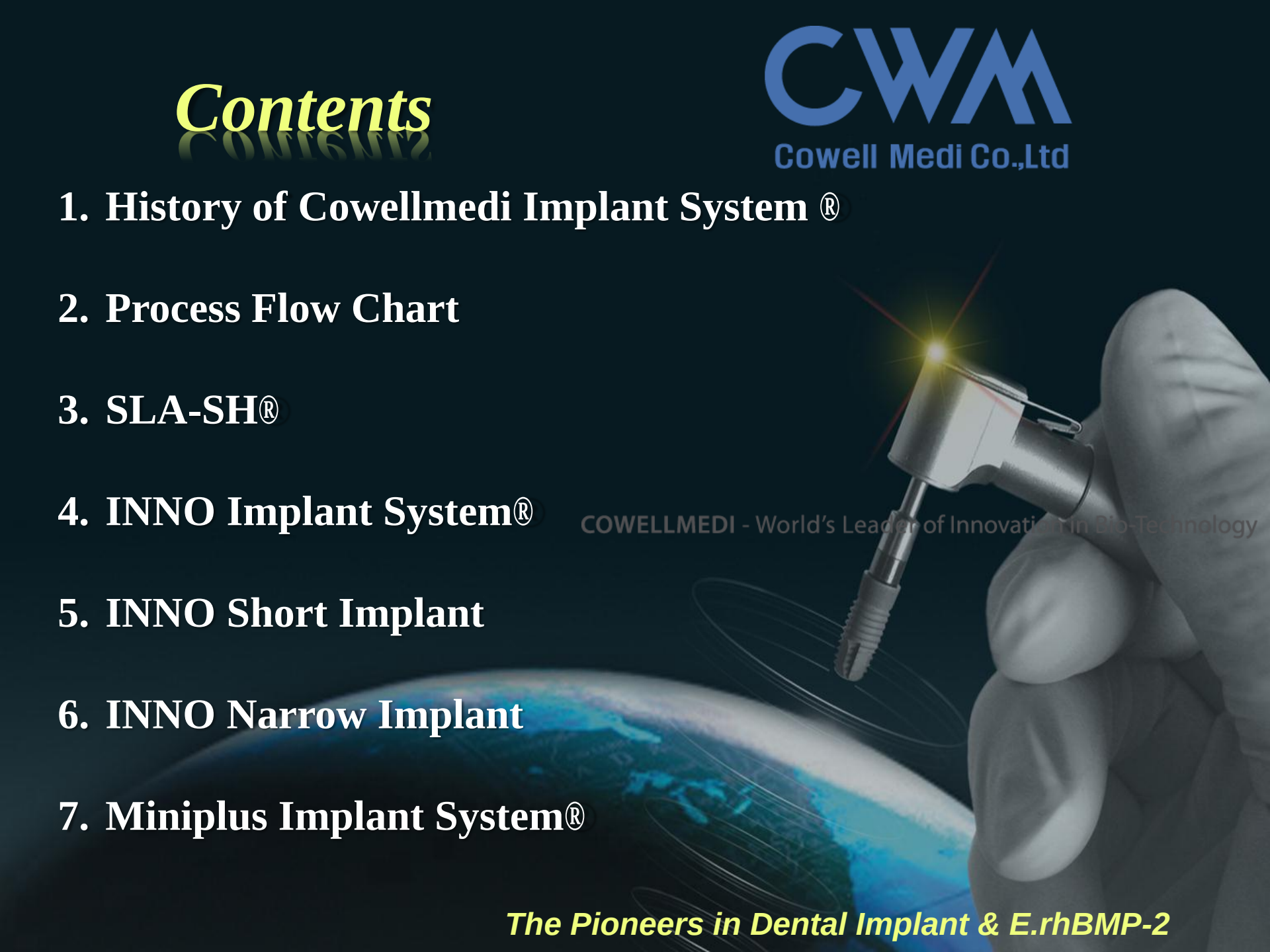
CWM
Cowellmedi Co., Ltd.

Since 1993

COWELLMEDI - World's Leader of Innovation in Bio-Technology

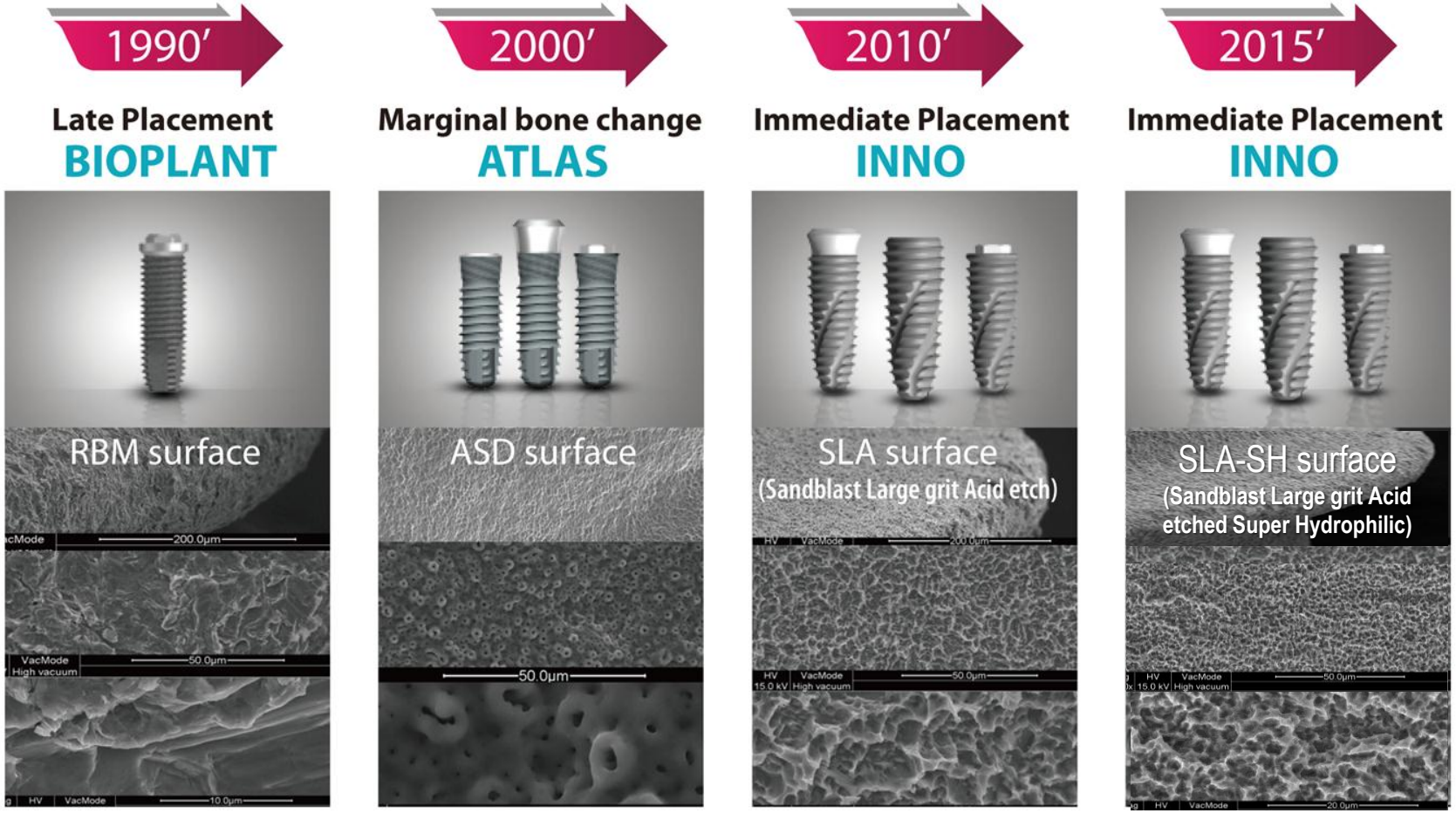
Contents

Cowell Medi Co.,Ltd



The Pioneers in Dental Implant & E.rhBMP-2

1. History of Cowellmedi Implant System

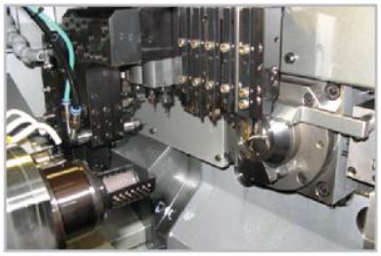


An Oldest Case of Korean Implant History

The Oldest Case of Korean Implant

°Patient Info.: 96 year old male
#35-Bioplant, 1st Generation of Cowellmedi, the first implant made in Korea placed in 1994
#25, 36 & 37 - Atlas Implant, 2nd Generation of Cowellmedi, the first ASD surface treated in Korea.
#32, 33 & 47 – INNO Implant, the 3rd Generation as well as the latest one.

2. Process Flow Chart


CNC Machining


Surface Treatment


Inspection


Cleansing


Packing / Sterilization


Shipping Warehouse

- Manufacturing Process with world's most advanced technology
- Inspection is carried out between each procedure

3. SLA-SH® Surface Treatment

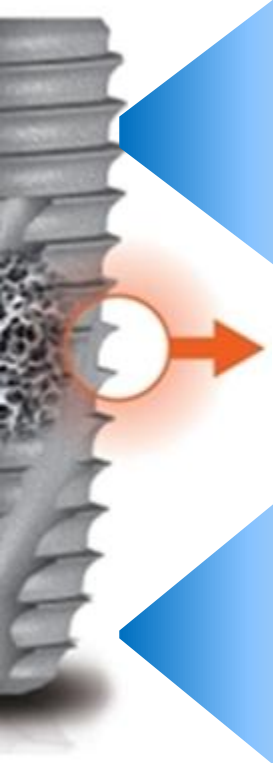
Sandblast Large grit Acid etch Super Hydrophilic

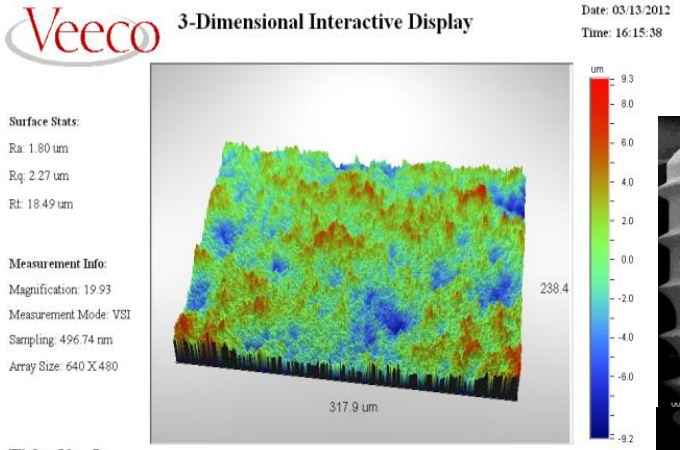
- World's first SLA super hydrophilic surface made by dry process
- Hydrophilicity by activation with Alkali Rinsing Solution & Nano Ca/P coating
- Macro-pore & Micro-pore of Ti-Oxide layer mimicking the etched enamel rod of tooth
- Even Distribution of roughness through the whole portion of Implant Surface

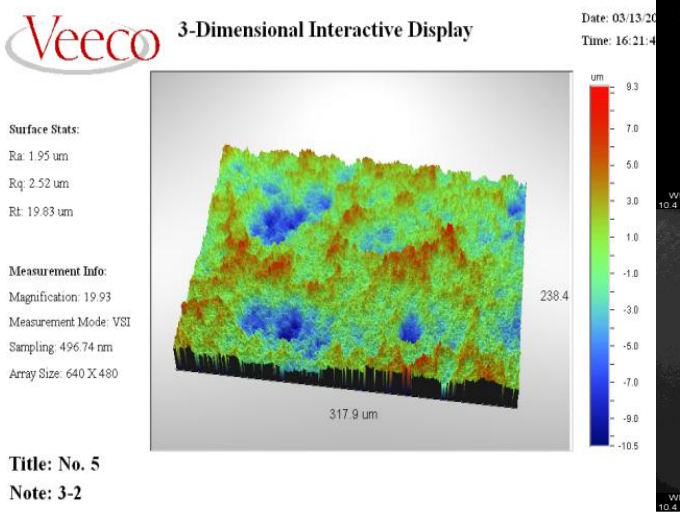
▶ Acceleration of Osseointegration
Maximization of BIC (Bone to Implant Contact)

* SLA-SH is applied for All of Cowellmedi Implant

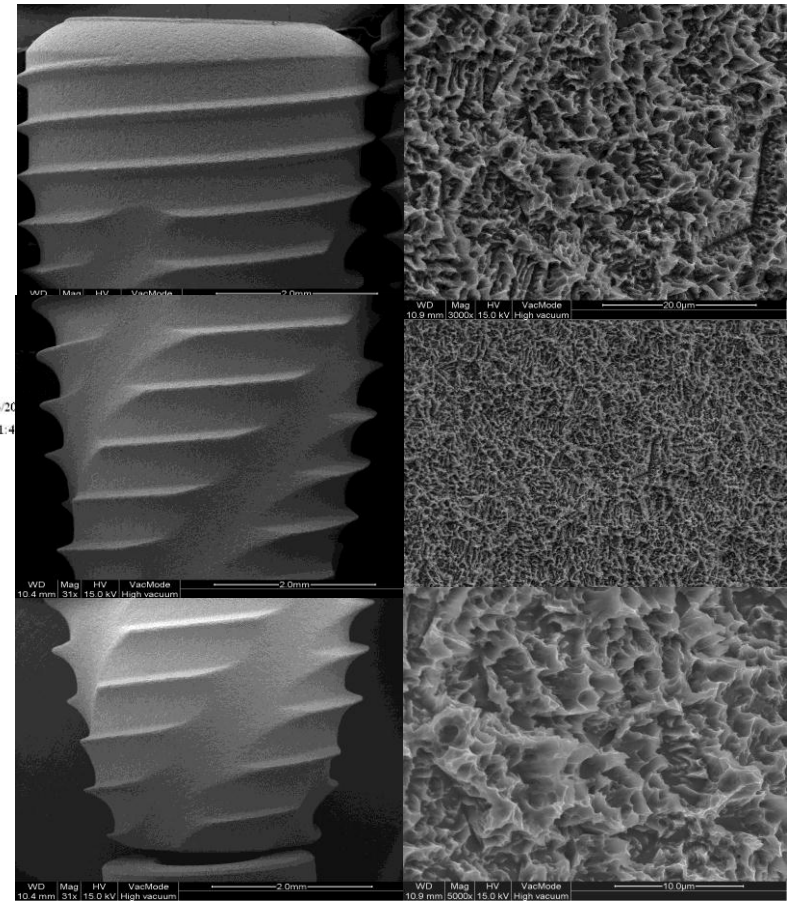
SLA-SH® : Roughness



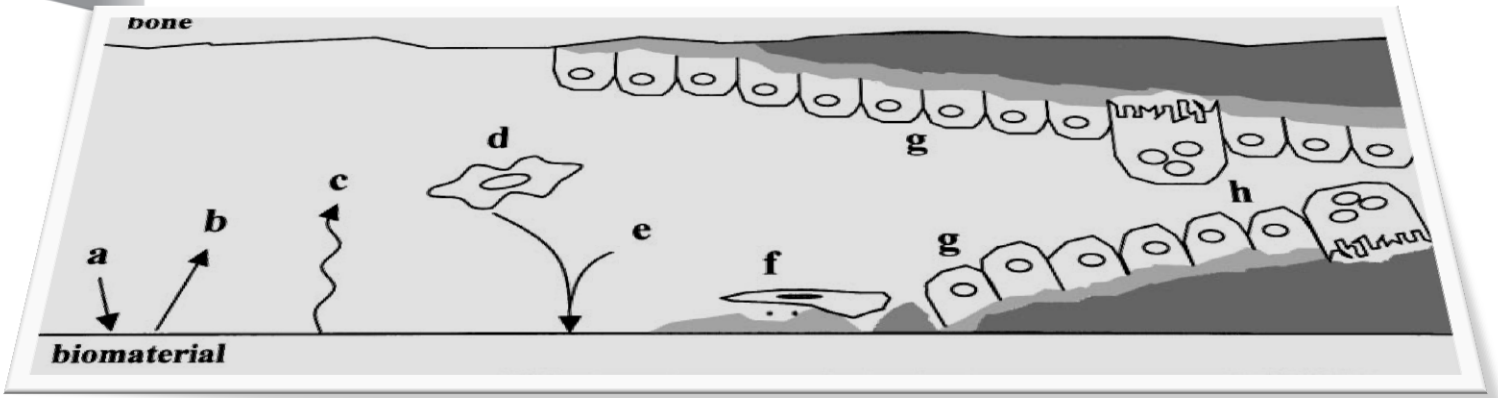




Ra=1.8um



Why is Roughness of Surface Important ?



Nucleating and mineralizing ability of the implant surface

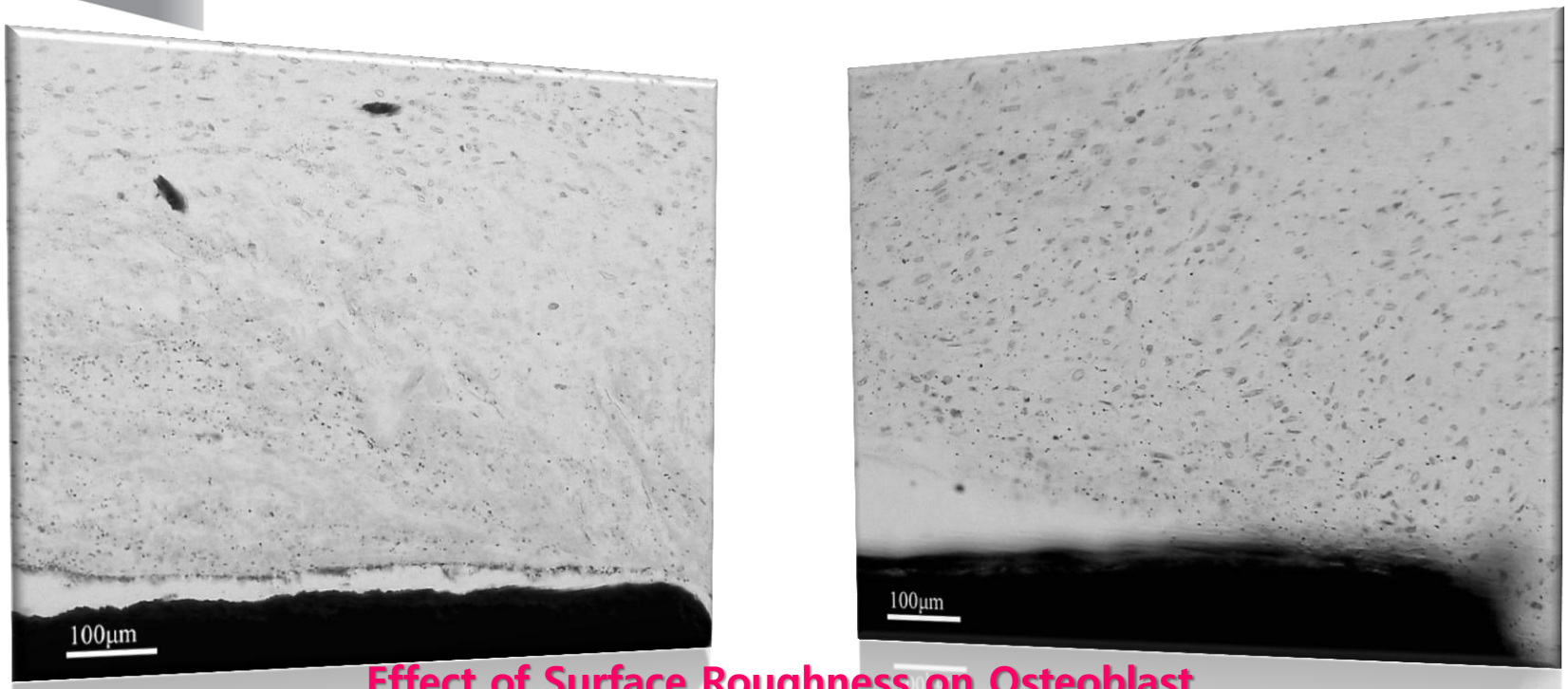
Osteoblast

- Proliferation of cells
- Enzyme activity of calcification

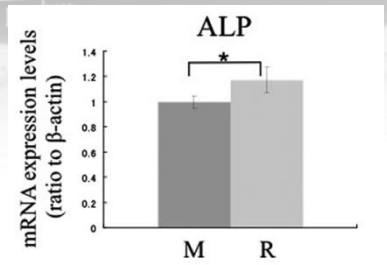
Osteoclast

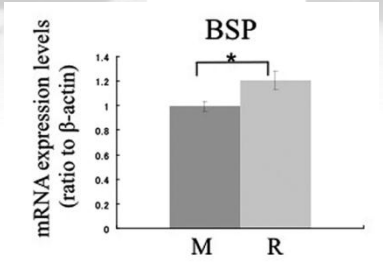
- Phago-cytosis acitivity of injury bone
- Remodeling of trabeculae

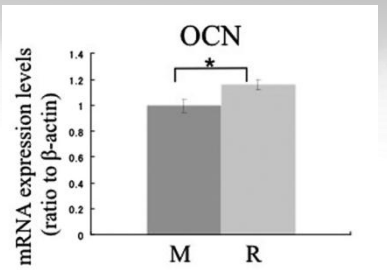
Why is Roughness of Surface Important ?



Effect of Surface Roughness on Osteoblast



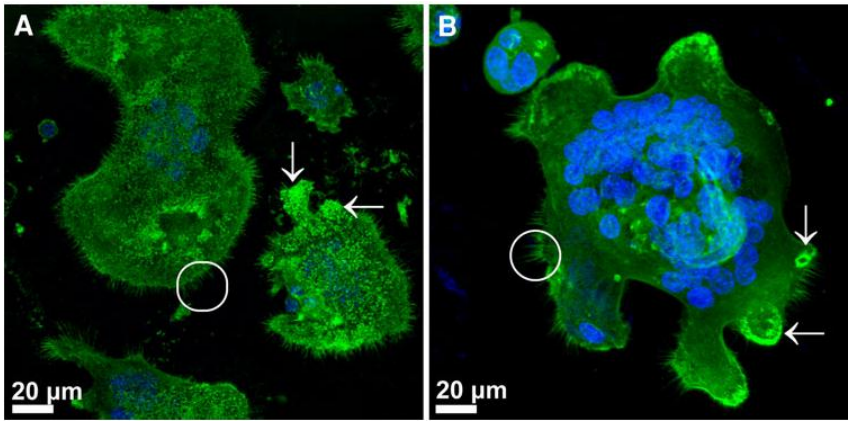


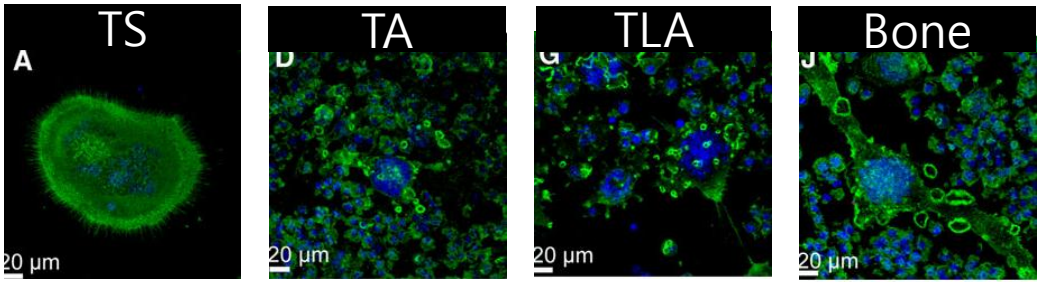


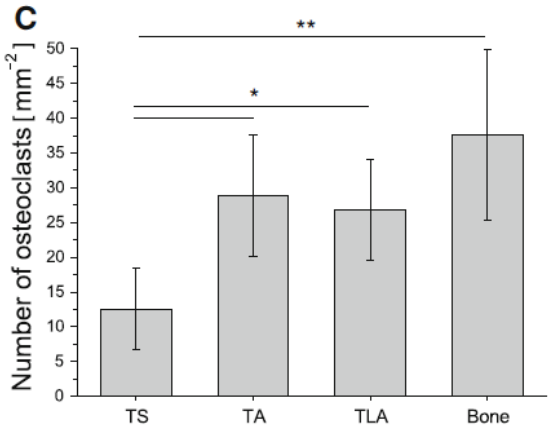
Toshihiro Hara et al. Effect of Surface Roughness of Titanium Dental Implant Placed under Periosteum on Gene Expression of Bone Morphogenic Markers in Rat. Bull Tokyo Dent Coll (2012) 53(2): 45–50

Effect of Surface Roughness on Osteoclast

Short name	Treatment	S_a (μm)
TS	None	$(2.1 \pm 0.1) \times 10^{-3}$
TA	Hot acid etched	1.33 ± 0.05
TLA	Sandblasted and hot acid etched	2.60 ± 0.30



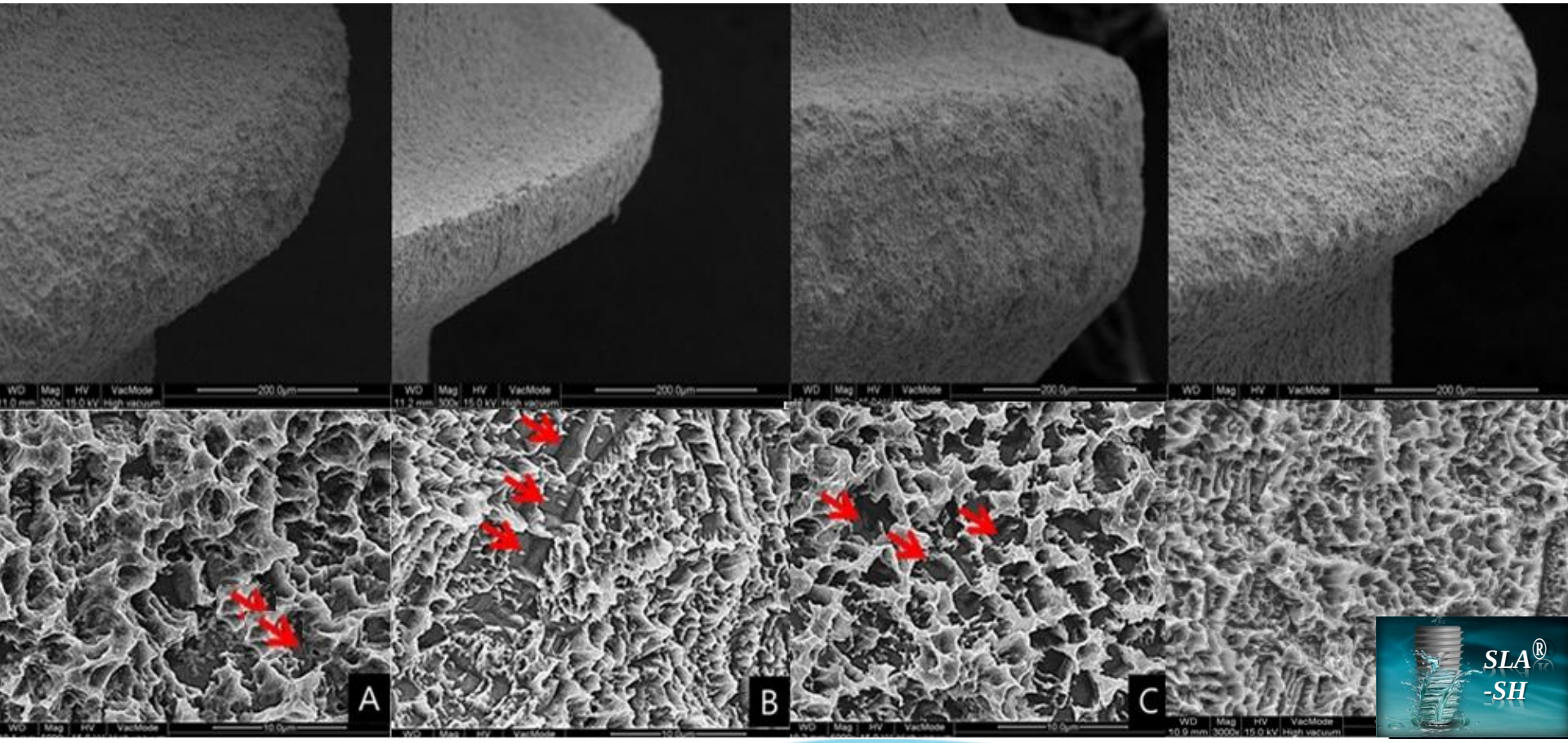




Jenny Brinkmann et al. Response of Osteoclasts to Titanium Surfaces with Increasing Surface Roughness: An In Vitro Study. Biointerphases (2012) 7:34

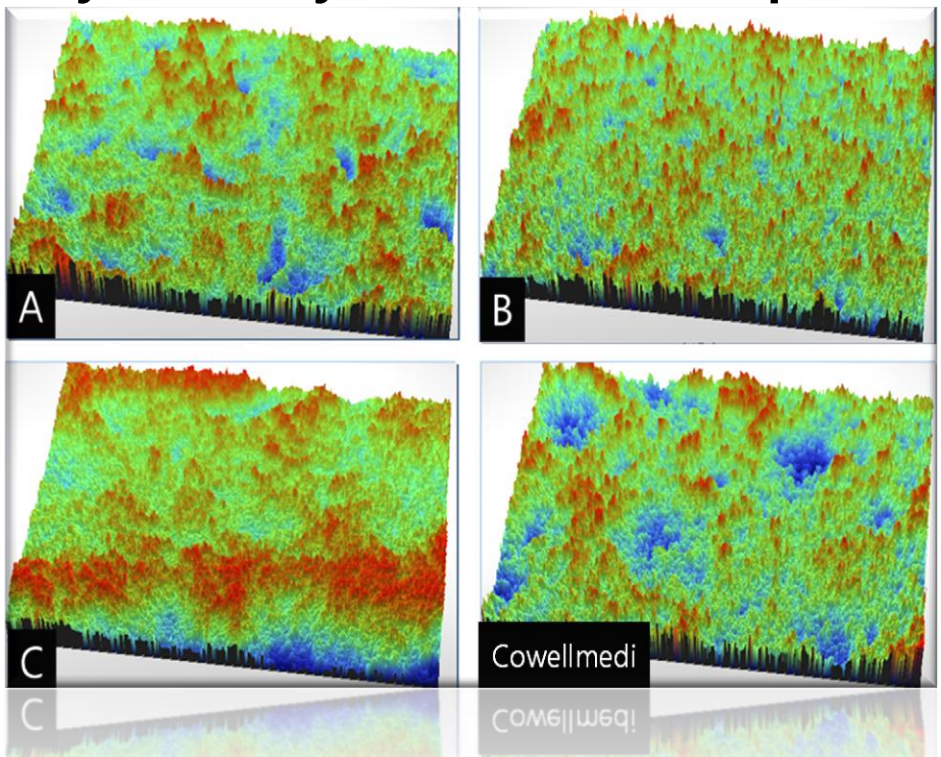
Comparison to other SLA Surface Treated Implants in market

SEM Photograph Analysis (Scanning Electron Microscope)



Comparison to other SLA Surface Treated Implants in market

XPS Analysis (X-ray Photoelectron Spectroscopy)



The difference of roughness at whole surface was lowest in Cowellmedi SLA-Bioactive®, compared with others

Comparison to other SLA Surface Treated Implants in market

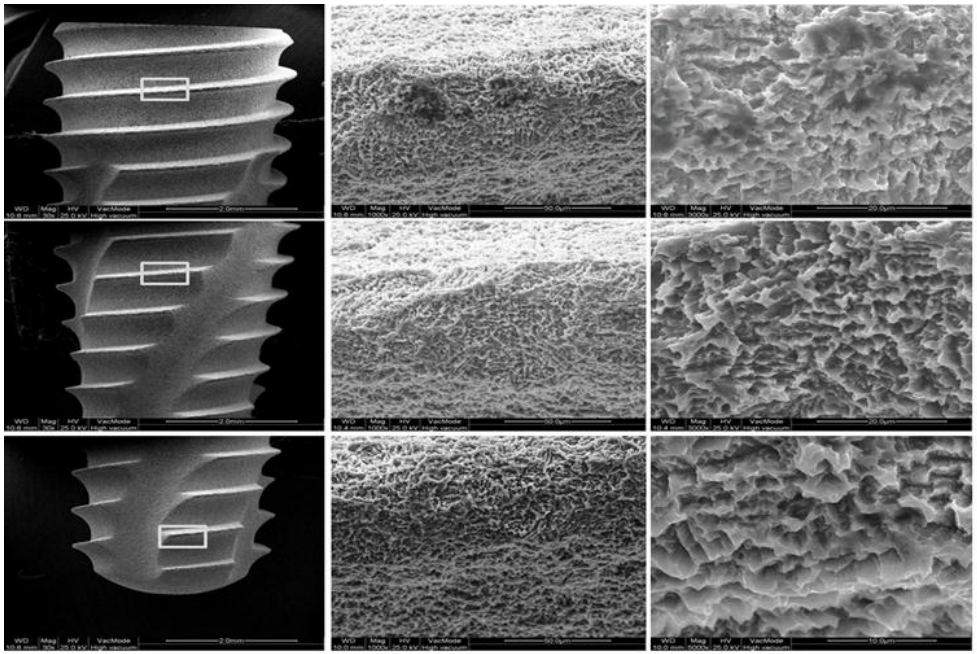
Average		Min. ~ Max.	Difference	Uniformity
1	Cowellmedi	Ra= 1.59um~1.80um	Ra=0.21um	1
3	A	Ra= 1.48um~3.11um	Ra=1.63um	4
4	B	Ra= 0.61um~1.13um	Ra=0.52um	2
2	C	Ra= 1.31um~2.65um	Ra=1.34um	3

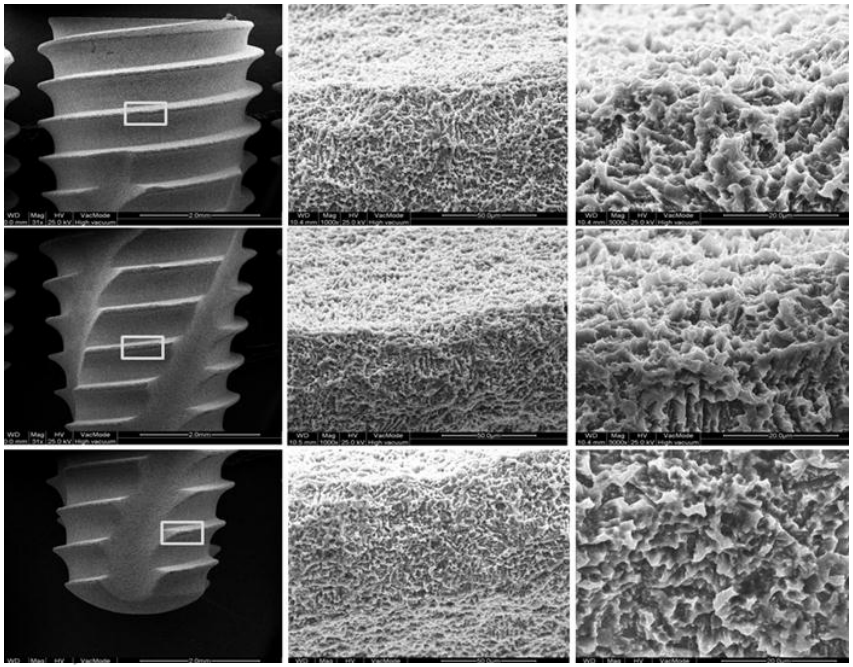
Conclusion

- Surface treatment pattern were observed on electron microscope photographs of 5000 magnifications for the implants.
- Defects of sandblasted surface conditions were observed in Sample A,B, and C due to insufficient acid etching patterns in deep parts.
- The entire surface of INNO Implant treated with SLA-Bioactive® showed uniform acid atching patterns.
- This implies that the sandblasting and acid etching method of Cowellmedi' SLA-Bioactive® is perfect.

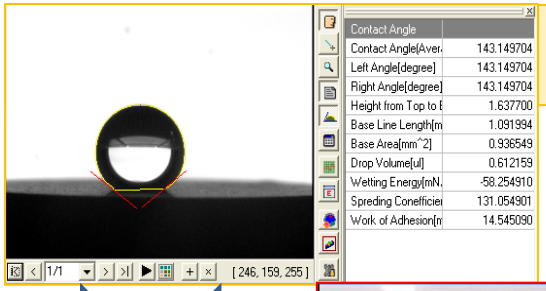
Surface abrasive resistance in high torque placement

- Fixture placement torque 45 and 80 N/cm
- The micro-structure of titanium oxide layers in the crestal, middle and apical threads are maintained without the abrasion and defect.



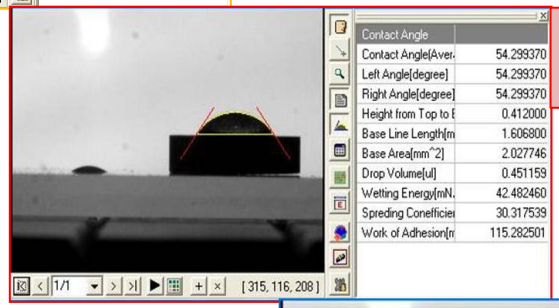


World's Cutting Edge Surface Treatment : Super Hydrophilicity



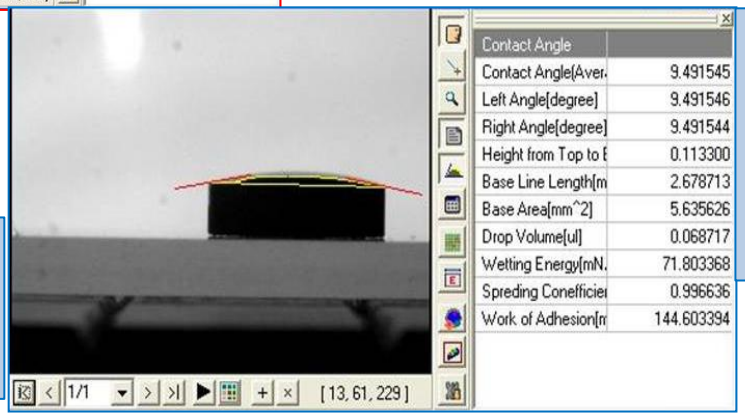
SLA = 143°
Hydrophobic Effect by air contamination

Surface Energy Maxmization



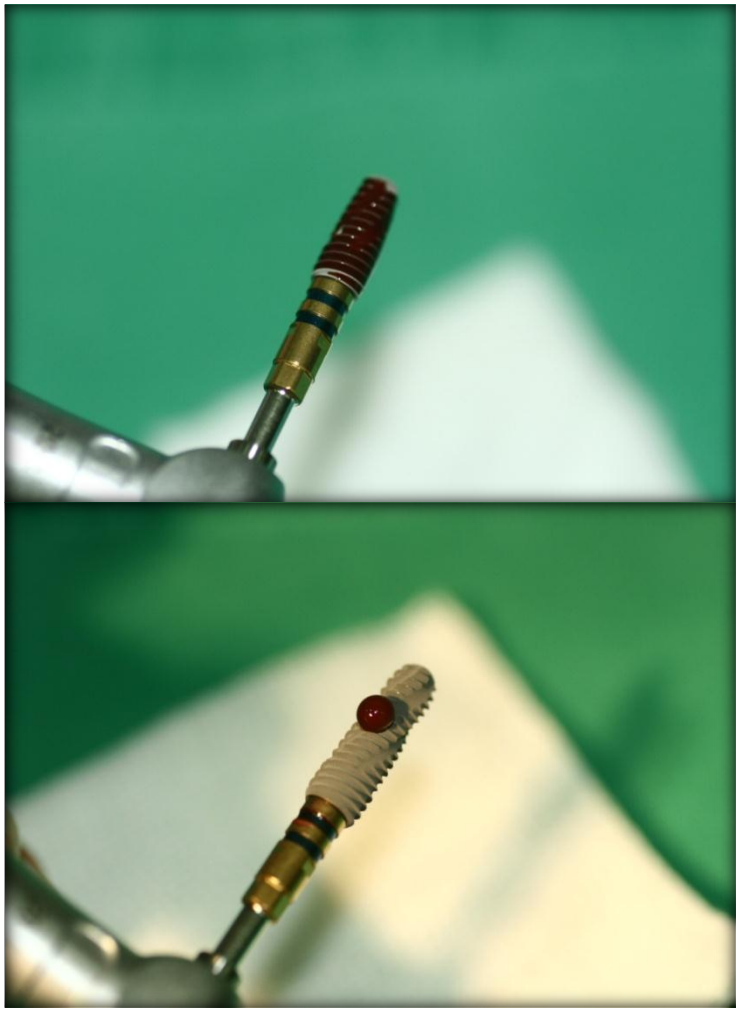
SLA+Neutralization = 36°
⇒ Hydrophilic

Calcium ions hydrothermal treatment



SLA + Neutralization + Na/Cap= 9°
⇒Super Hydrophilic

Why is Hydrophilicity of Surface Important ?



1. Faster Osseointegration

- Earlier Bone Formation
- Better Stability from faster osseointergration

2. Higher Success Rate

- Higher Success Rate
- Ideal for Immediate Placement

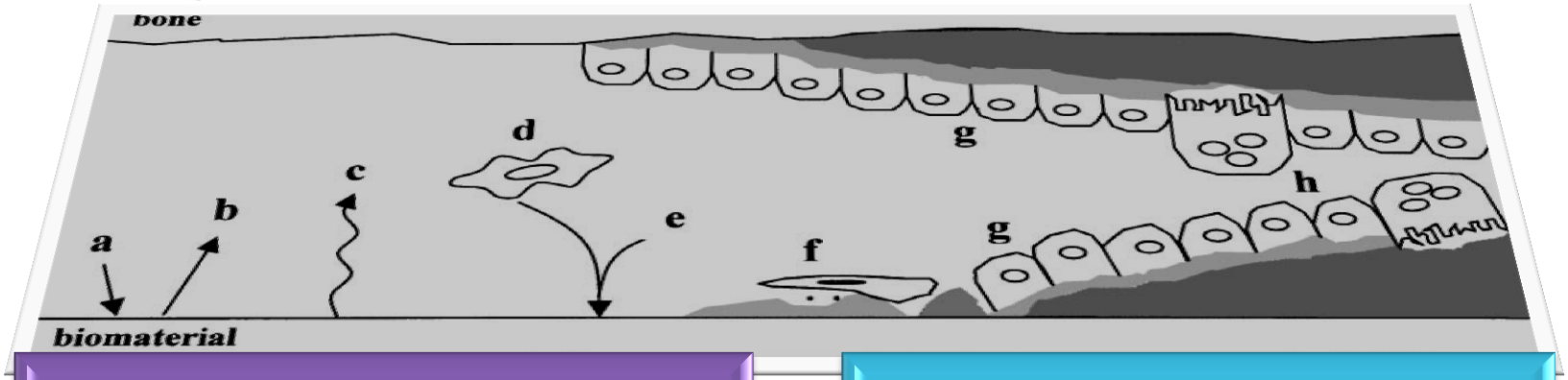
3. Super Hydrophilicity by dry process

- The first surface in the world made by dry process
- Application of surface reforming & surface energy maximization

4. Chemical Activation (Cell Reaction)

- Cell Reaction beginning upon placement
- Chemically Optimized Activation

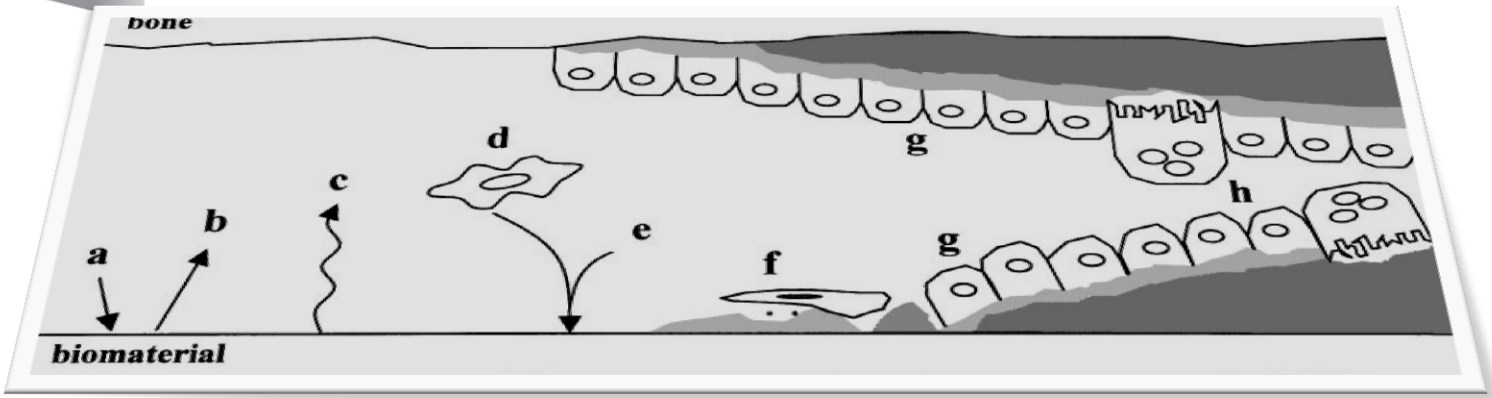
Why is Hydrophilicity of Surface Important ?



Biochemical and cell physiological processes of the implant surface	Nucleating and mineralizing ability of the implant surface
• **Physicochemical properties**	• **Topography**
• Surface charge	• Macro-pore
• Surface energy	• Micro-pore
• Hydrophilicity	• Surface Roughness(Ra)

Franchi M, Fini M, Giavaresi G, Ottani V. Peri-implant osteogenesis in health and osteoporosis. Micron. 2005;36:630.44.

Why is Hydrophilicity of Surface Important ?



Biochemical and cell physiological processes of the implant surface

Fibrinogen

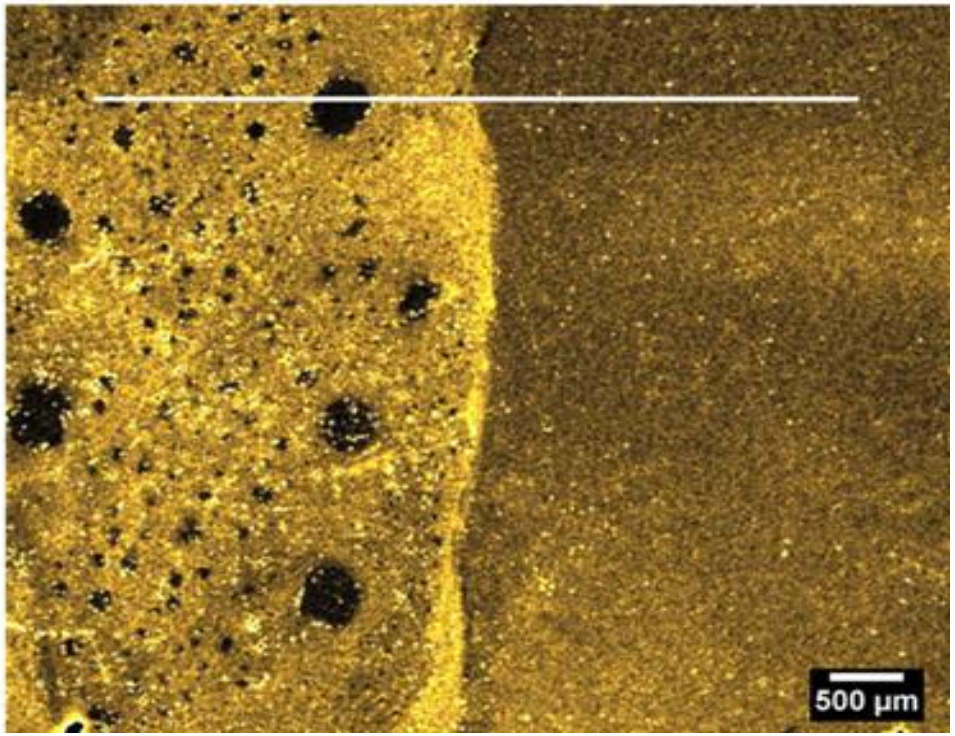
- Fibrinogen adsorption from blood and tissue fluids and desorption
- Surface changes and material release

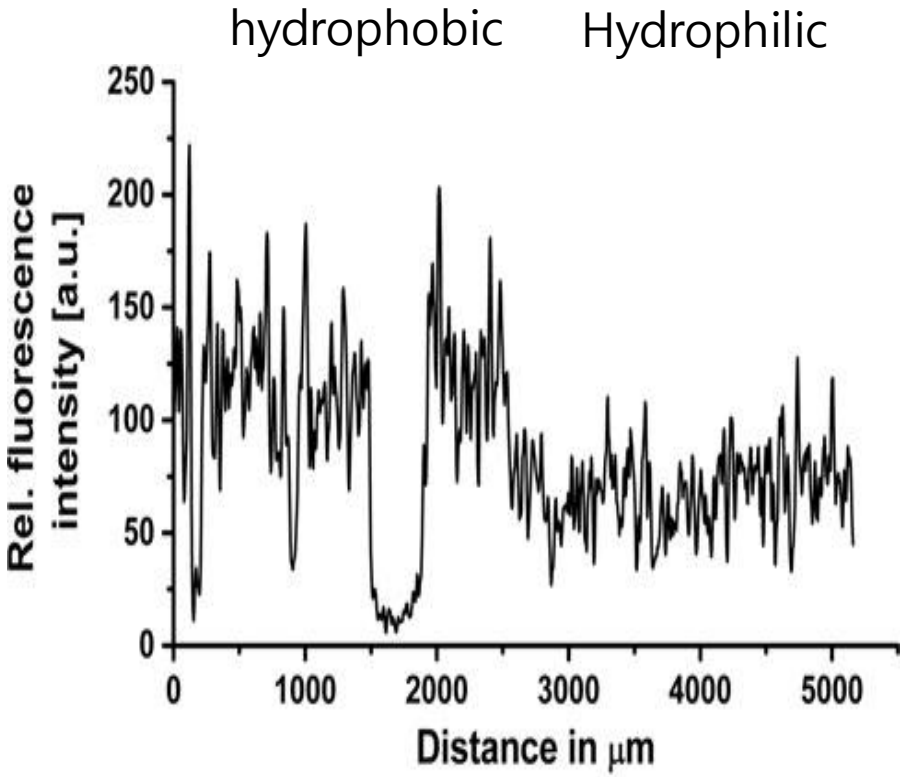
Extracellular Matrix

- Inflammatory and connective tissue cells approach
- release of matrix proteins and selected adsorption of proteins

Why is Hydrophilicity of Surface Important ?

The effect of hydrophilic surface on Fibrinogen adhesion

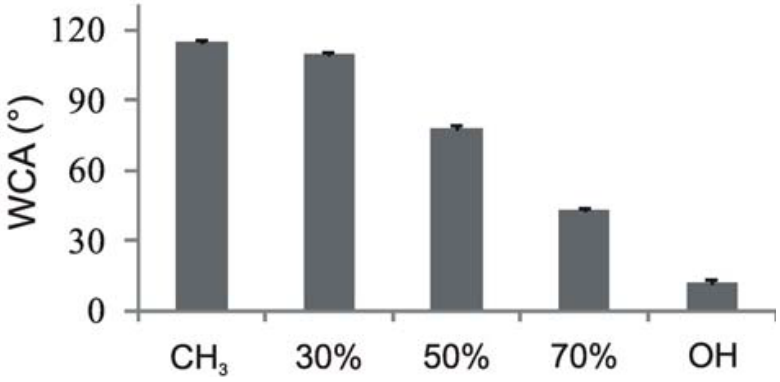


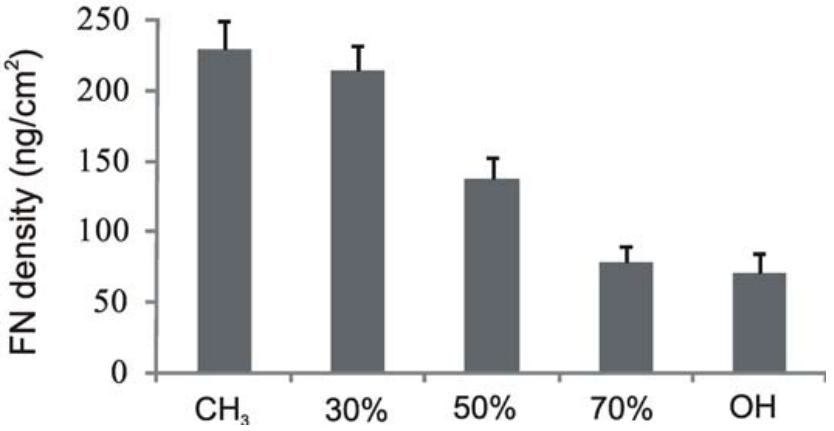


Fibrinogen Alexa Fluor solution

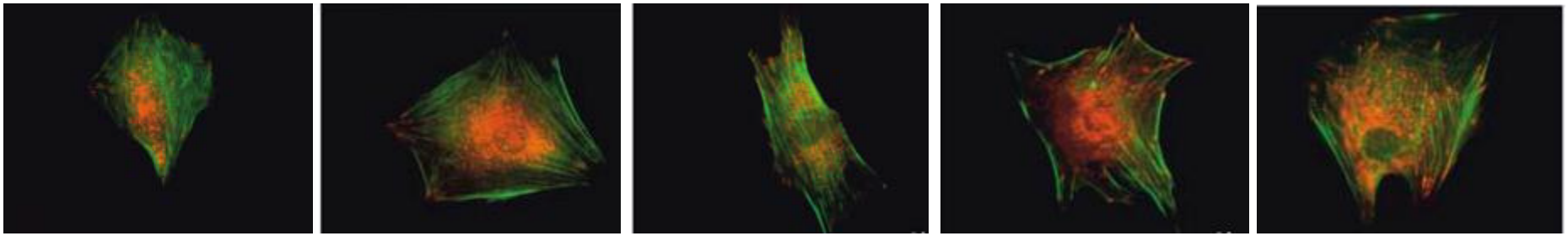
Stefano Tugulu et al. Preparation of superhydrophilic microrough titanium implant surfaces by alkali treatment. J Mater Sci: Mater Med (2010) 21:2751–2763

Why is Hydrophilicity of Surface Important ?





Role of Hydrophilicity in Protein Remodeling of cells

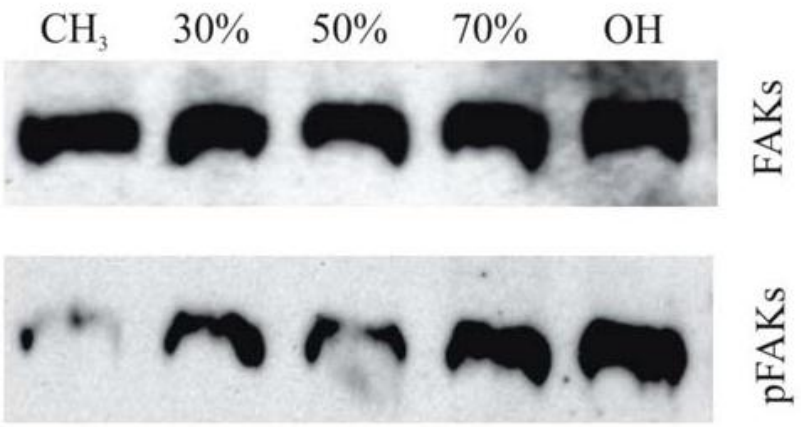


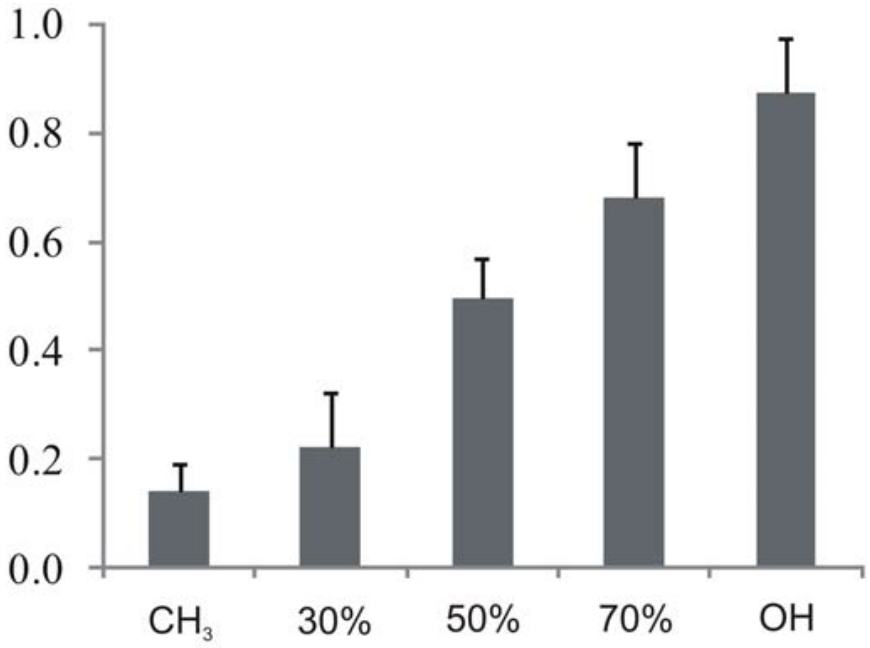
Adhesion of MC3T3-E1 cells after 3 hours on FN coated SAMs.

Virginia Llopis-Herna´ndez., et al. Role of Surface Chemistry in Protein Remodeling at the Cell-Material Interface. PLoS ONE | www.plosone.org May 2011,| Volume 6 ,| Issue 5,| e19610

Why is Hydrophilicity of Surface Important ?

Total FAK expression (protein and gene) of MC3T3-E1 cells





Role of Hydrophilicity in Protein Remodeling of cells

Virginia Llopis-Herna´ndez., et al. Role of Surface Chemistry in Protein Remodeling at the Cell-Material Interface. PLoS ONE | www.plosone.org May 2011,| Volume 6 ,| Issue 5,| e19610

Super Hydrophilicity of SLA-SH

Alkali Rising Solution

Nano Ca/P layer

- **Bioactive Osteo-conduction**
- **Complete Resorption**

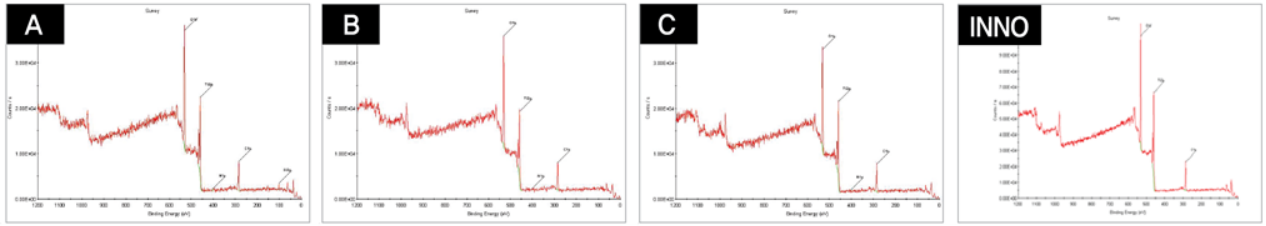
Conclusion

The water contact angle of SLA-SH® hydrophilic surface becomes 9° after Nano Ca/P Coating & NaOH Solution rising and Hydrophilicity is well maintained.

(In static water contact angle measurement, the water contact angle below 40° means hydrophilic and below 10° is extremely hydrophilic)

World's Cutting Edge Surface Treatment : Biocompatibility & Safety

Its safety has been proven through perfect cleaning with an automated system



Comparison of surface element tests through X-ray diffraction

Unit : %

Sample	C1s	O1s	Ti2p	Si2p	N1s
A	34.12	45.05	15.11	5.24	0.47
B	31.84	46.49	15.22	4.87	1.57
C	32.19	47.58	17.58	2.65	N.D
INNO	27.19	50.81	17.61	N.D	N.D

Comparison of surface element tests (X-ray Photo-electron Spectroscopy, XPS)

- **Quantitative analysis of each surface element found 30% carbon, 47% oxygen, 16% titanium, and 4% silicon in all products.**
- **For INNO, they only consisted of carbons(C1s), oxygen(O1s), and titanium(Ti2p).**
- **Sodium hydroxide, the main element of the alkali washing solution, combined with silicon(Si) to form water-soluble $Na_2SiO_2(OH)_2 \cdot 4H_2O$(water glass), which removed the other elements.**

▶ Researched by KRISS (Korea Research Institute of Standards and Science)

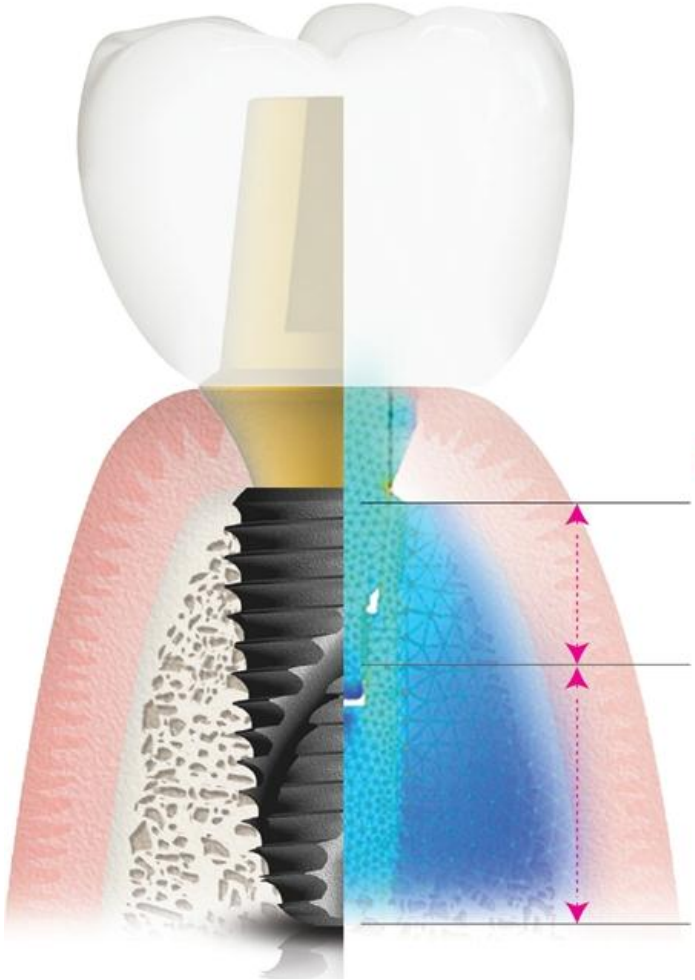
World's First SLA-SH Surface made by dry Process

Lab. name	Item of test		Cowellmedi (2012.07.06)	A (2012.04.06)	B (2012.04.06)	C (2012.04.06)
Korea Electro-ceramic lab.	EDAX-upper	Si	N/D	0.64	N/D	N/D
	EDAX-middle	C	N/D	3.21	2.66	N/D
		O	N/D	N/D	4.07	N/D
	EDAX-lower	Al	N/D	N/D	0.79	N/D
Korea basic Science Reasearch center	IC	Cl	0.012	0.024	0.027	0.071
		NO_2	N/D	0.027	0.019	0.02
		NO_3	0.028	0.031	0.03	0.023
		SO_4	0.026	0.002	0.002	N/D
	ICP	Na	N/D	N/D	N/D	N/D
		Si	N/D	0.02	N/D	N/D
	XPS-upper	N	N/D	0.47	1.57	N/D
		Na	N/D	N/D	N/D	N/D
		P	N/D	N/D	N/D	N/D
		Si	N/D	5.24	4.87	2.65
	XPS-middle	N	3.77	2.17	1.8	0.99
		Si	N/D	5.95	N/D	N/D
	XPS-lower	N	N/D	0.92	2.35	1.22
		Si	N/D	4.67	N/D	N/D
		Rank	1	4	3	2

4. INNO Implant System®

- Made by the longest experience in Korea
- Designated for Simper, Speedier & Safer Surgery
  - SLA-SH® Surface Treatment is applied
  - Simple & Fast loading
  - No micro thread design
  - Made of Ti Gr4
  - High initial stability
  - Tapered Conical Connection
  - Easy access of Surgical Kit
  - Various Fixture & Prosthesis Selection

Fixture: Outline Form



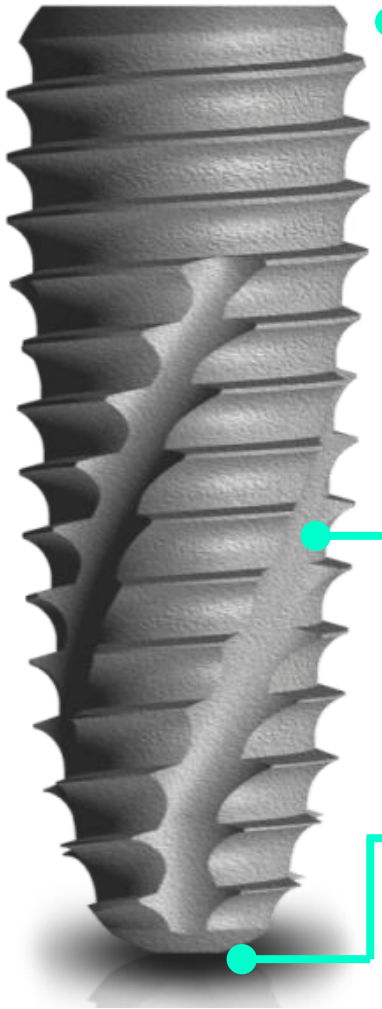
Outline Form

- Crestal Straight Portion
  : For maintain stress bearing

- Apical Tapered Portion
  : For anchoring in socket and bone

Designated for Simpler, Speedier, Safer and Superior Treatment

Fixture: Outline Form



Platform Neck

- Prevents Possible Infections around the implant
- Stable engraftment of periosteum in boundary surface of bone and implant

Open Thread

- Possible to place deeper even without additional drilling

Wide & Deep upper thread

- Prevents the compressive necrosis of the cortical bone
- Minimizes the need for countersink drills
- Reinforces mechanical strength by reinforcing thickness

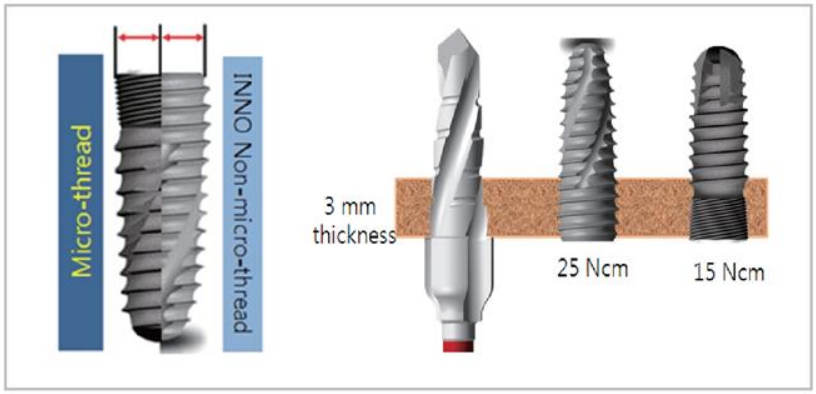
4 Spiral round cutting edges

- Maximize the efficiency of self tapping with a sharp edge
- Accommodates bone chips as ideal cutting edge pocket space

Apex Thread with sharply round cutting edges

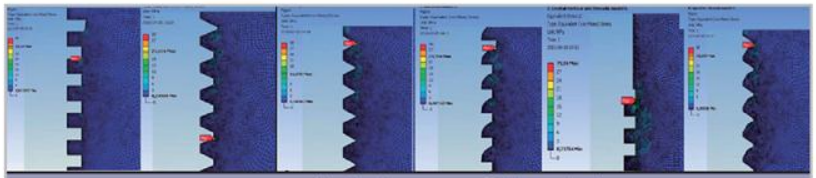
- Higher Initial Stability
- Prevent ripping of sinus membrane

Fixture: No Micro Thread



Non micro thread

- Higher stabilization in non-microthread design at shallow sinus bone.
- Prevents marginal bone loss distributing stress into the whole body of implant.

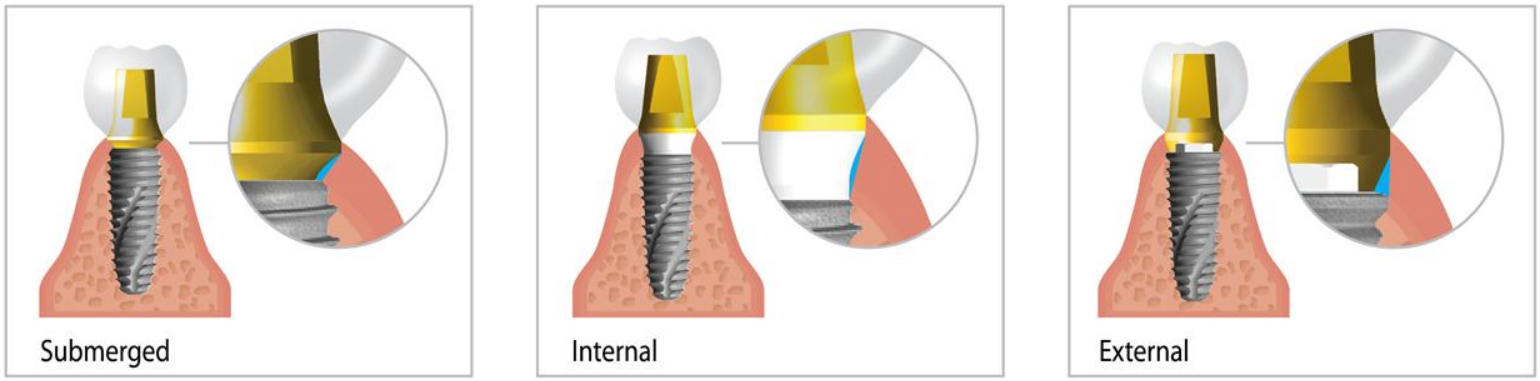


Thread Design	Vertical Load (Mpa)	Oblique load, 45 degrees (Mpa)	Difference
Power thread	16.3	17.7	1.4
Power acme thread	30.9	57.13	26.23
V-triangular thread	12.6	30.13	17.9
Buttress thread	8.4	12.8	4.4
Crestal vertical slot thread	11.3	31.9	20.6
Spiral lock thread	4.8	12.8	8

Buttress thread

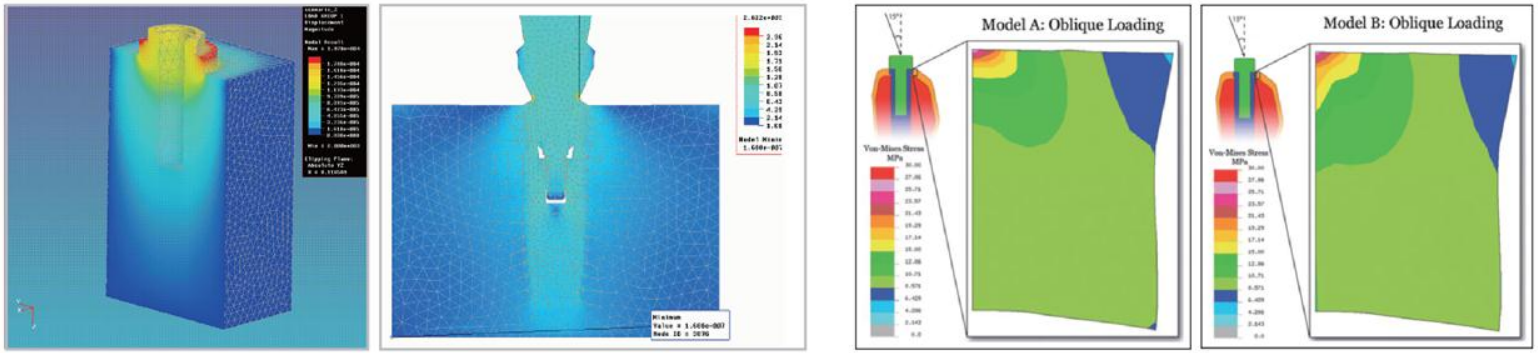
- The ideal thread design distributes well functional force and prevents the focal concentration of stress in the thread and bone.
- The thread of INNO is buttress which shows the lowest concentration in tread & bone.

Fixture: Maximizing Platform-Switching without loosing Stability



Platform-Switching

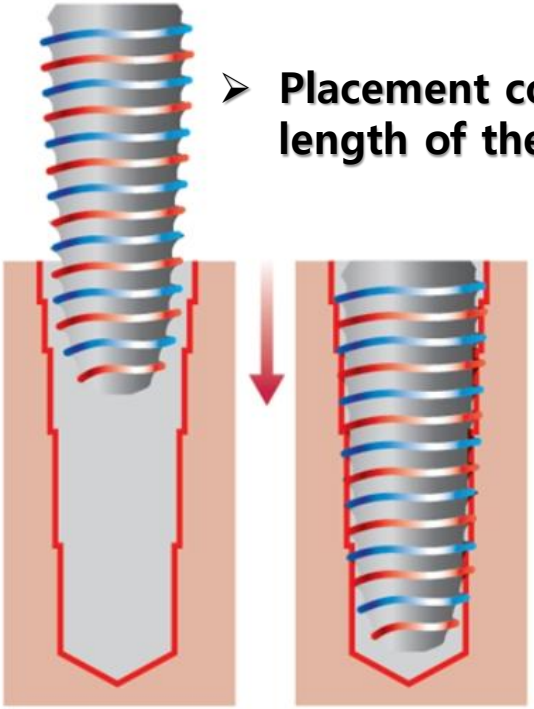
The platform-switching design enables the artificial root and abutment to withstand masticating force and minimizes the loss of the alveolar bone. Moreover, the design increases the volume of the gingival, so it is aesthetically satisfactory.



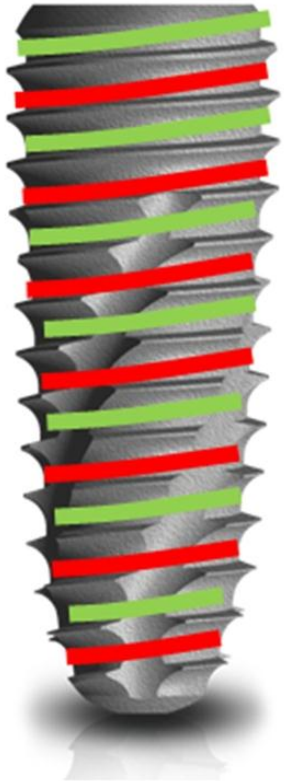
▸ Hom-Lay Wang et al. Platform switching effect on implant crest bone stress. Implant Dent 2009;18:260–269

Fixture: Double Tapered Thread

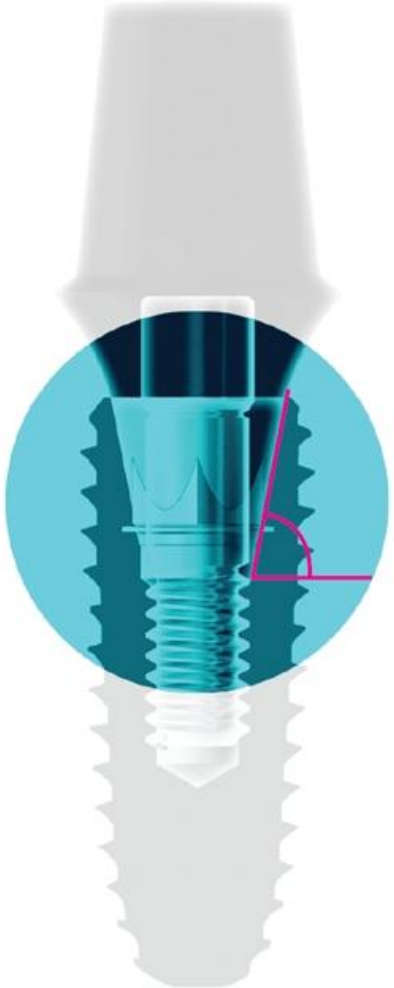
- Secures intial fixation even for an alveolar socket or parts with weak bone quality
- Placement complete with only 2~4 rotation with half the length of the implant inserted in hole formed by drilling



- Acquires higher primary stability though a wedge action even with an additional half turn
- Shortens the placement time with 5mm more of already entered depth



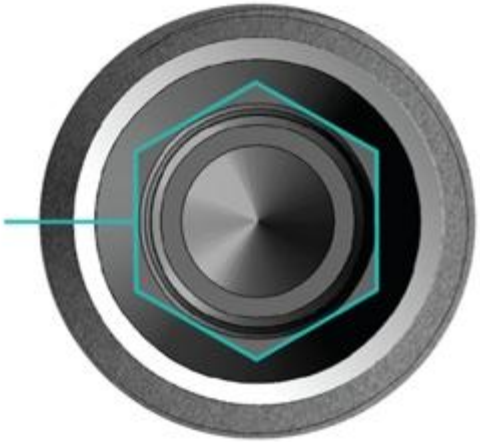
Fixture: Connection



11° tapered conical connection

- Minimizes Shrinkage
- Perfect Sealing by cold welding between Implant and Prosthesis

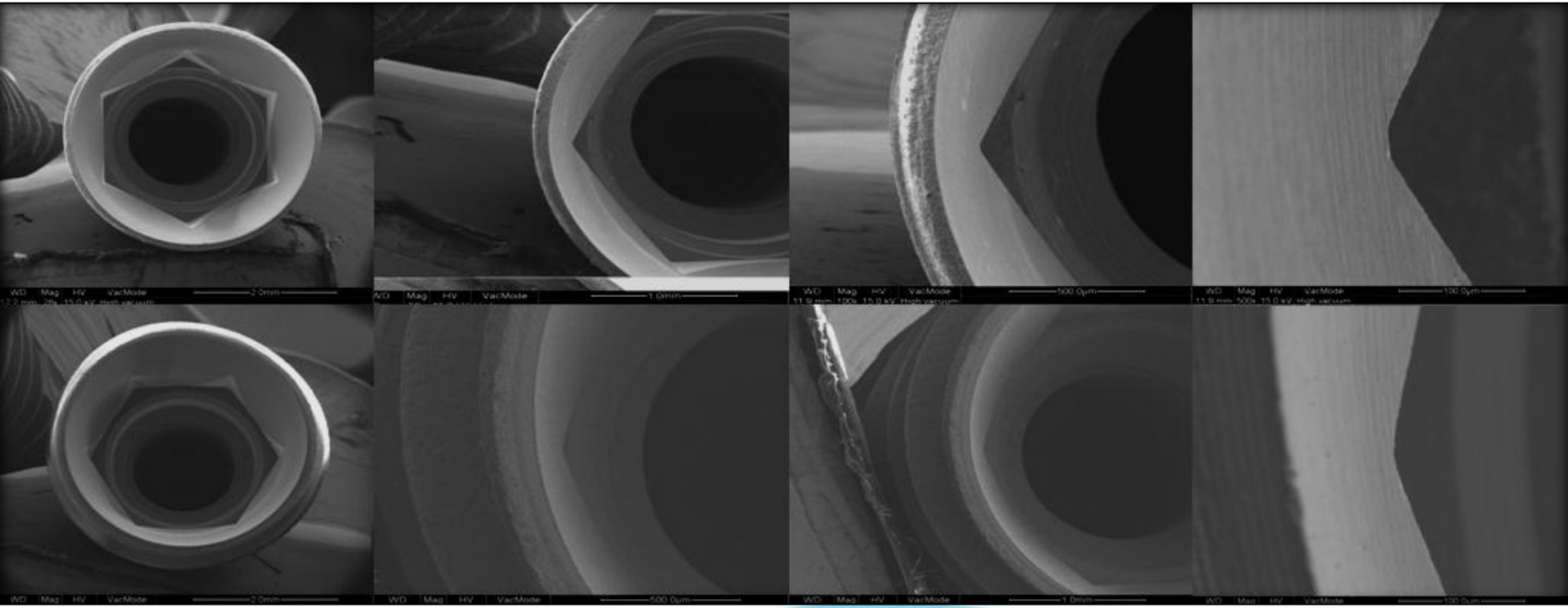
Hexagonal Connection



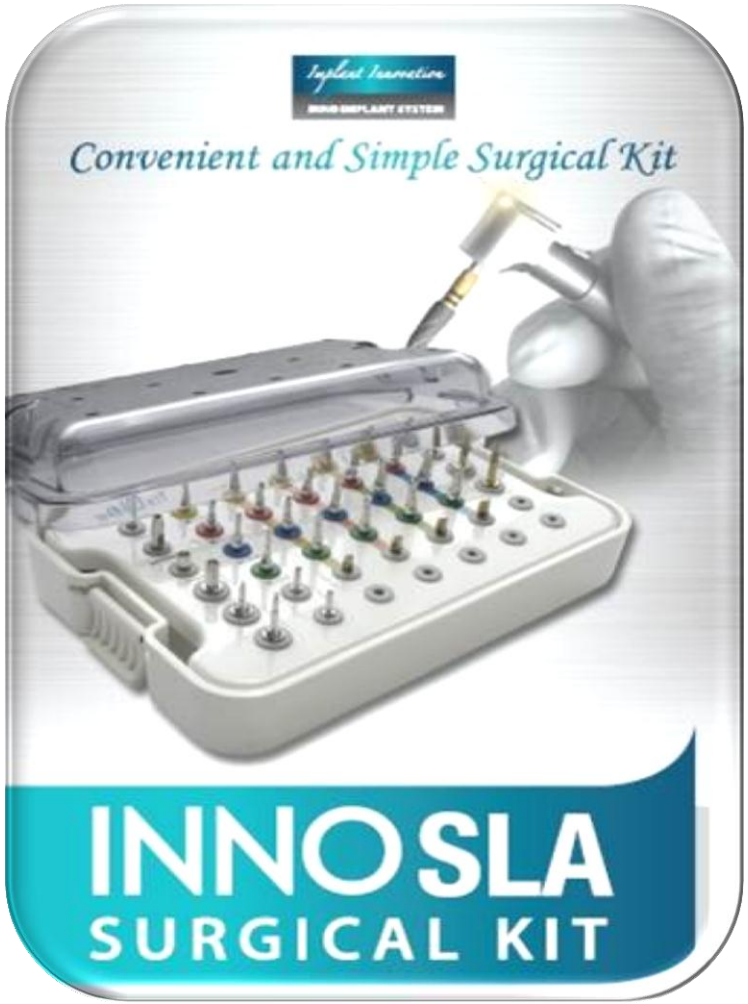
- 2.5 Standard Connection
- Outstanding Anti-rotation
- Excellent Compatibility

Fixture: Connection

- There is no defects found in the connection part of Implant
- Perfect Sealing between Implant & Prosthesis



Surgical Full Kit: Composition

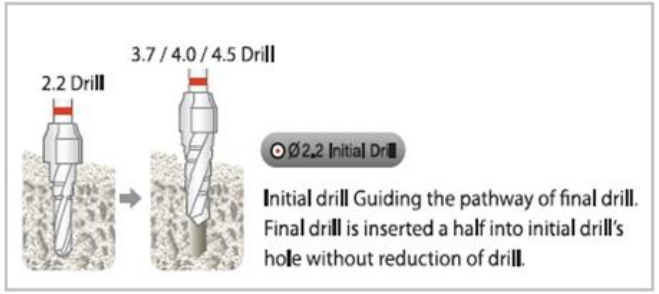


INNO Surgical Full Kit

- Sub. / Int. / Ext. / Provides three types of exclusive kits, respectively
- Provides a full kit that enables Ø3.5 / Ø4.0 / Ø4.5 / Ø5.0 / Ø6.0 Fixture placement

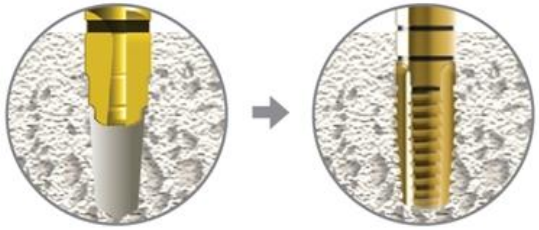
Minimal drill frequency with Ø2.2 Initial Drill and Final Drill

- The implant time is shortened because the fixture can be implanted with just three drillings for general bone quality (when implanting Ø3.5-Ø4.5 fixtures).

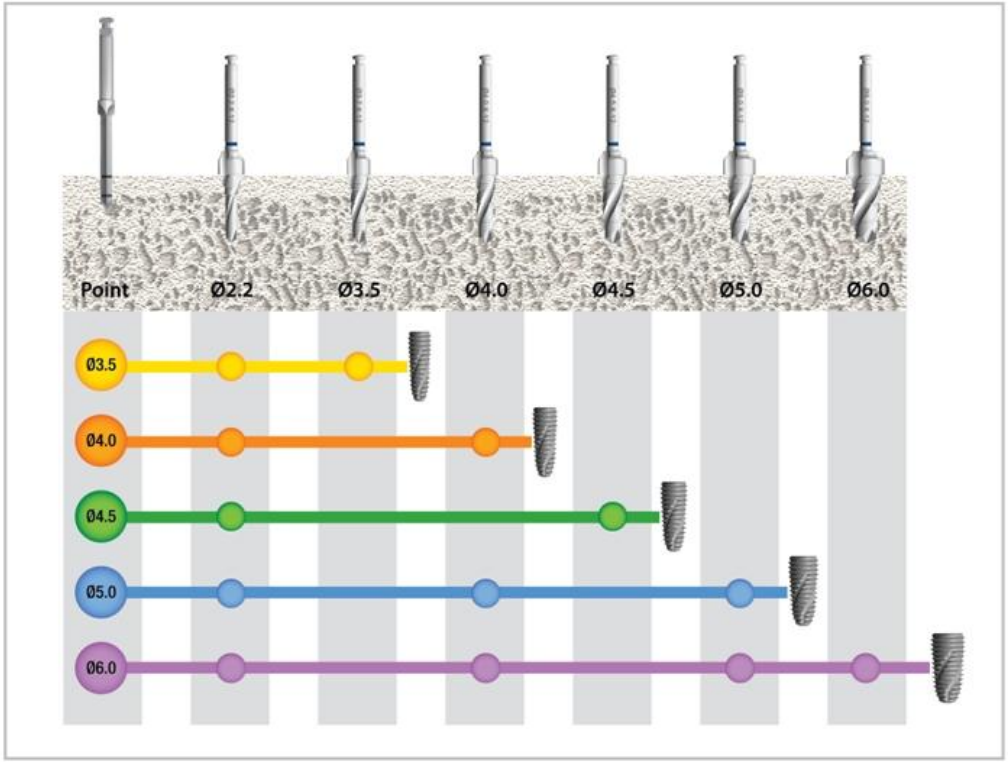


Surgical Full Kit: Minimal Drilling Sequence

Help you have more patients simpler, speedier & safer



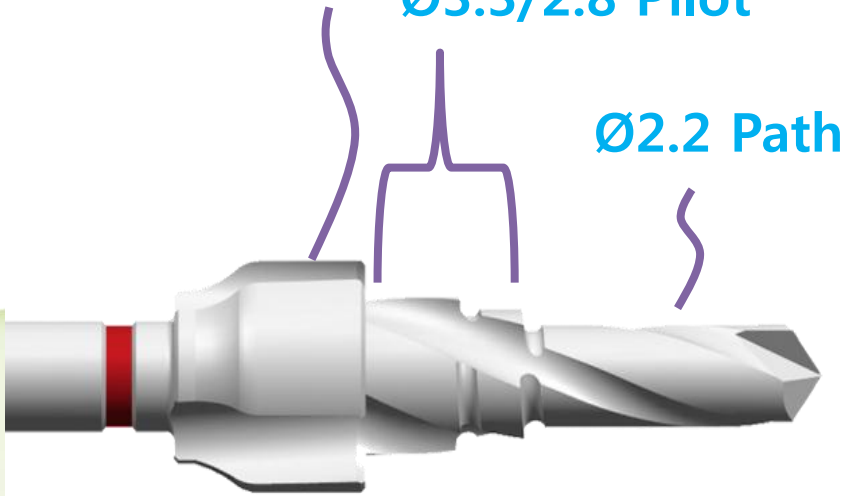
For dense & hard bone, counter sink & tap drill are required and for extremely dense, every step should be followed.



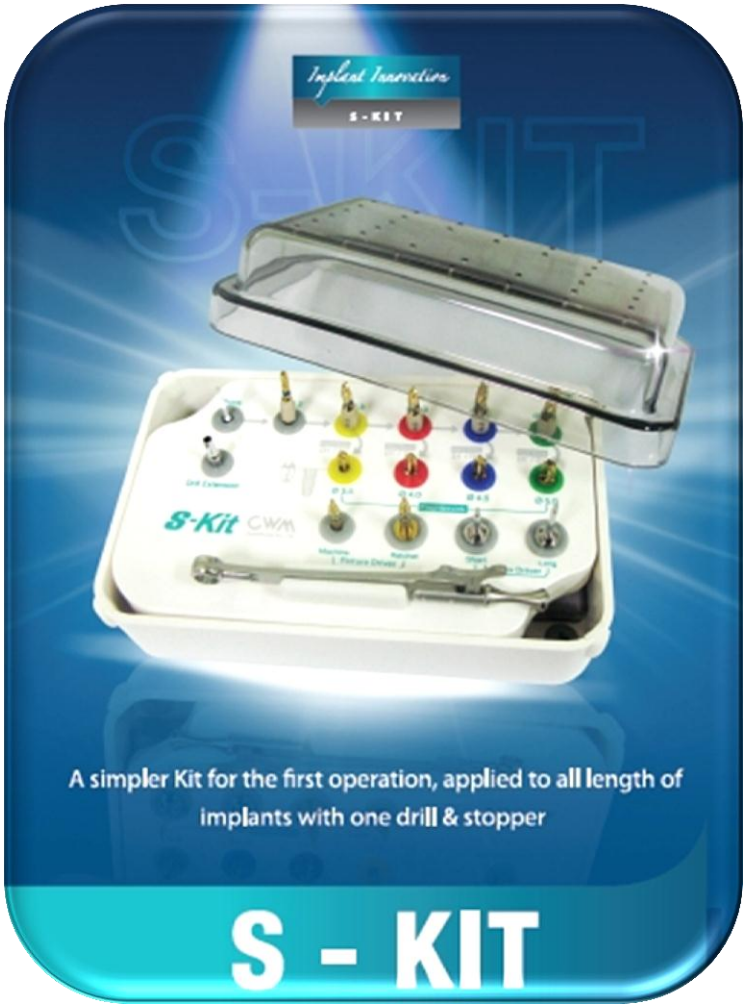
Surgical Full Kit: All in one in Initial & Final Drill

All in One

Ø4.9 Crestal cutter	• flattens the sharp and slopped ridge
Ø3.3/2.8 Pilot cutter	• guides the orientation of final drill
Ø2.2 Path cutter	• decides the direction of fixture



Smart Surgical Kit: Composition



Drill

Point Drill	Ø2.2 Drill	Ø3.5 Final Drill	Ø4.0 Final Drill	Ø4.5 Final Drill	Ø5.0 Final Drill	Ø6.0 Final Drill
KPD01S	2KTD22	2KTD35	2KTD40	2KTD45	2KTD50	2KTD60

Countersink

Ø3.5 Countersink	Ø4.0 Countersink	Ø4.5 Countersink	Ø5.0 Countersink	Ø6.0 Countersink
4KCS35	4KCS40	4KCS45	4KCS50	4KCS60

Extension & Driver

Drill Extension	M. Fixture Driver L	R. Fixture Driver L	1.2 Hex Driver L	1.2 Hex Driver XL	Torque Wrench
KDE002	2KMMS01L	2KHDS01L	KHD1221	KHD1227	KTW001

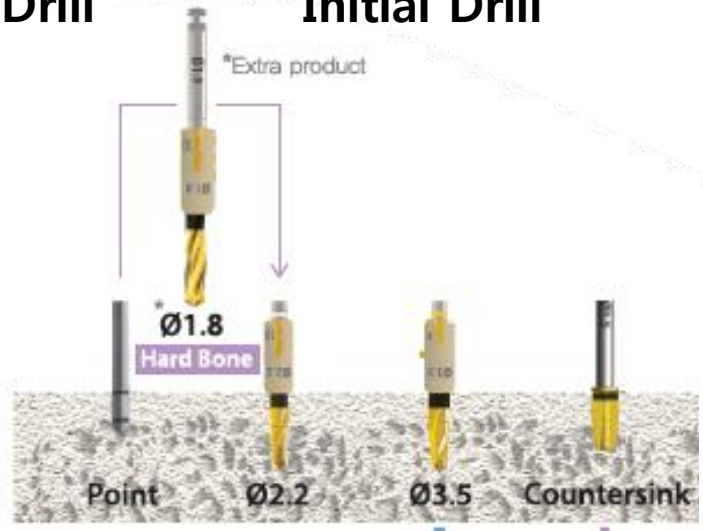
Smart Kit: Minimal Drilling Sequence

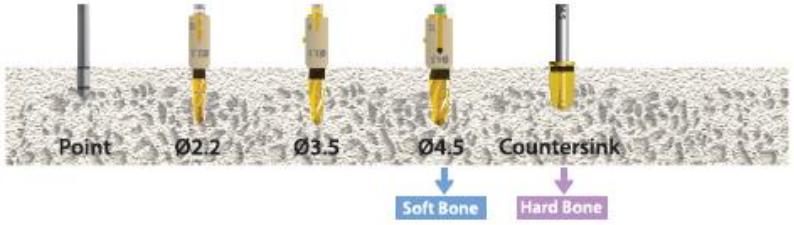
Point Drill

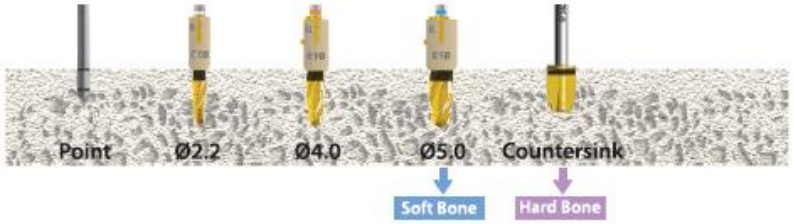
Initial Drill

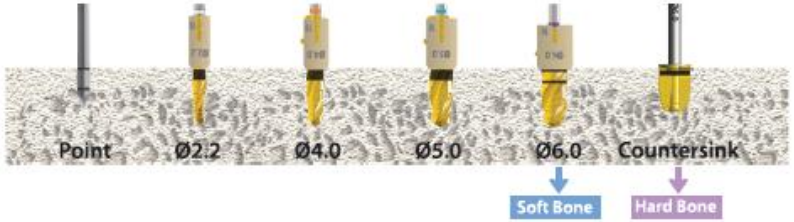
Final Drill

Implant Placement

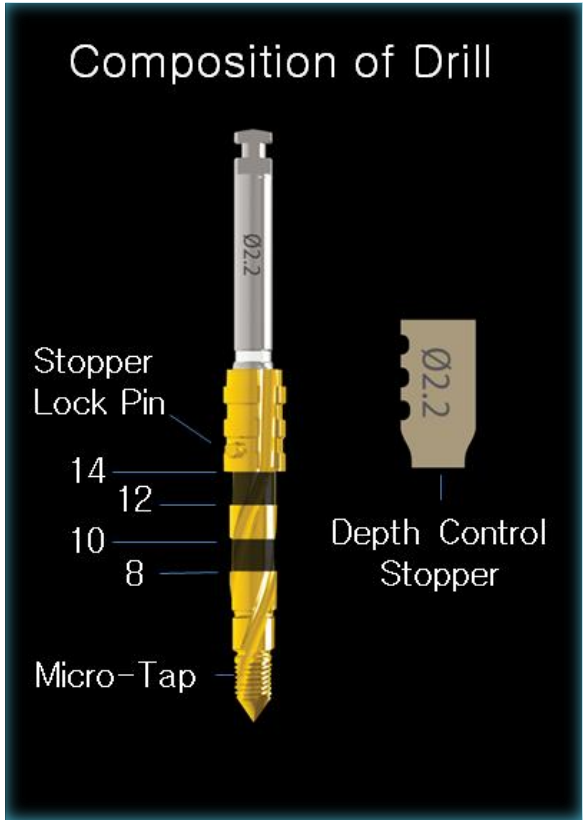


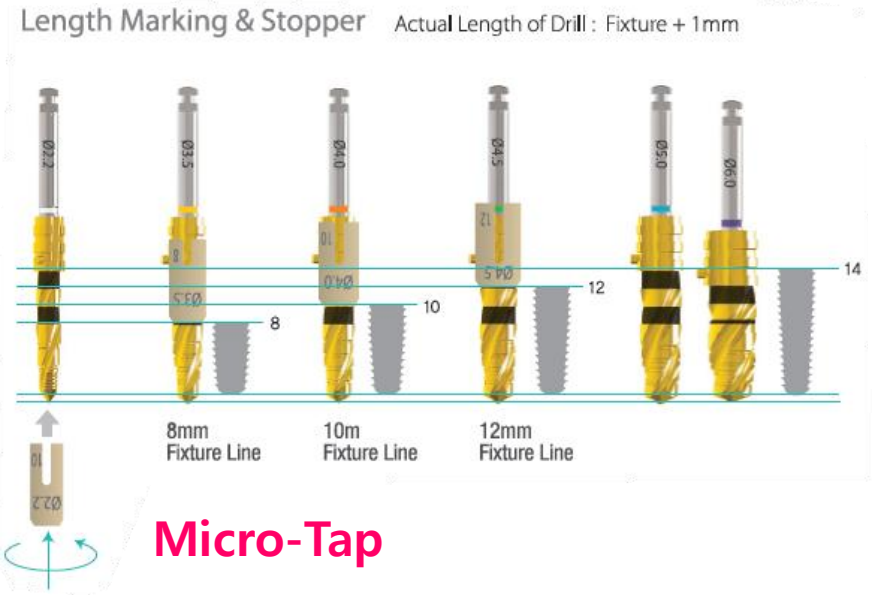


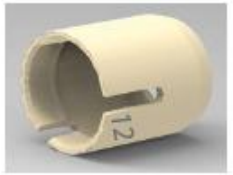




Smart Kit: Easy & Simple Access







Micro-Tap

- Automatic Intrusive Cutting Force
- Prevention of drill path change

Depth Control Stopper

- Easy Change of Depth
- Reduced Change of Drills

Full & Smart Surgical Kit Application: Control of Initial Stability

- 0.5 mm deeper placement
- Slopped edentulous ridge adjacent of tooth
- Pumping action of drill
- Wide extraction socket
- Weak bone quality 4
- Dense cortical bone

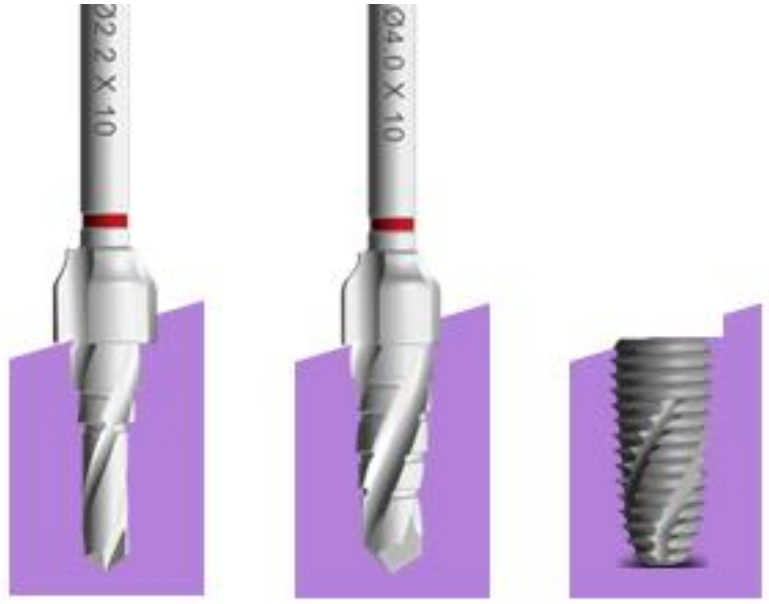
0.5 mm Deeper Placement

0.5 mm deeper placement of fixture increases the initial torque force of fixture.

Fixture placement level						
Level	Crestal level			0.5 mm deeper level		
Density	D1	D2	D3	D1	D2	D3
Torque	34.1	29	15.5	44.4	38.4	19.1

Slopped edentulous ridge adjacent of tooth

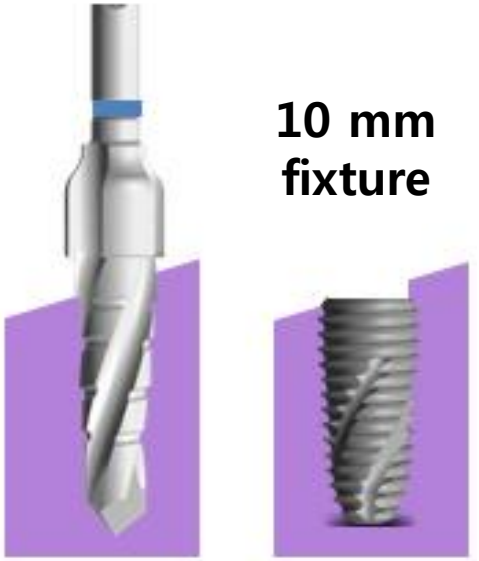
- **Crestal cutters of initial drill and final drill**
- **Longer drills than fixture's length.**



Crestal Flattening

12 mm drill

10 mm fixture

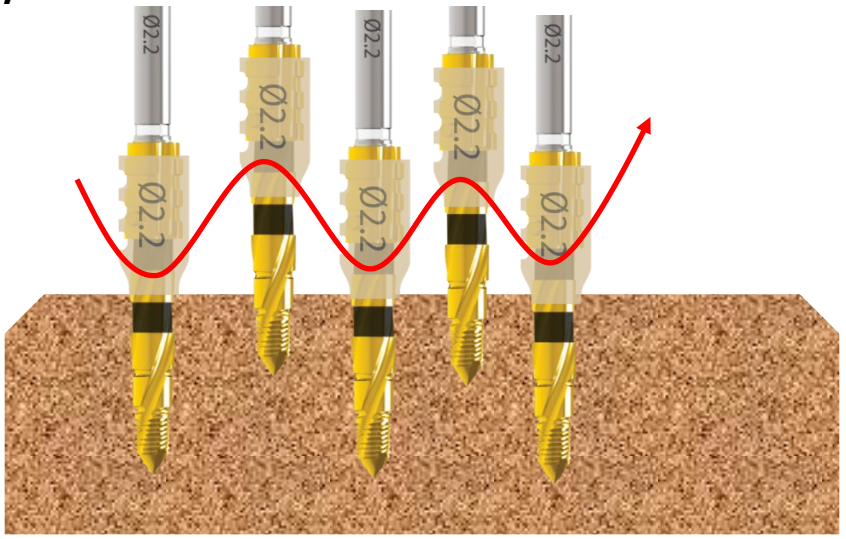


Longer Final Drill

Pumping Action

Pumping action of drill removes the bone chip in the hole.

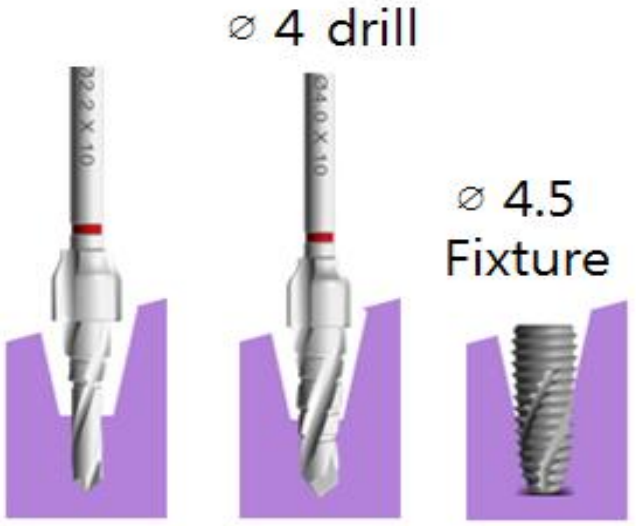
- **In dense bone, the debriment action decrease the high torque force.**



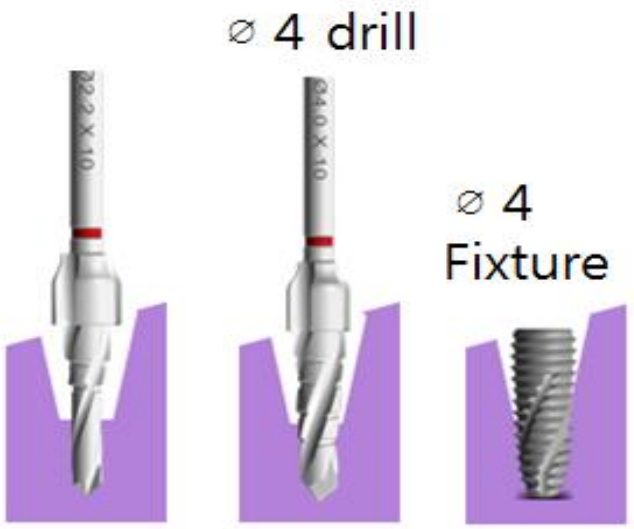
Pumping action of final drill for debriment			
Density	D1	D2	D3
Non- Debriment	34.1	29	19.6
Debriment	30	25	15.4

Wide Extraction Socket

- **Absence of the cortical bone & the limited bone height**
- **Narrower diameter drill than the fixture's diameter in soft residual bone.**
- **Same diameter drill with the fixture's diameter in dense residual bone.**

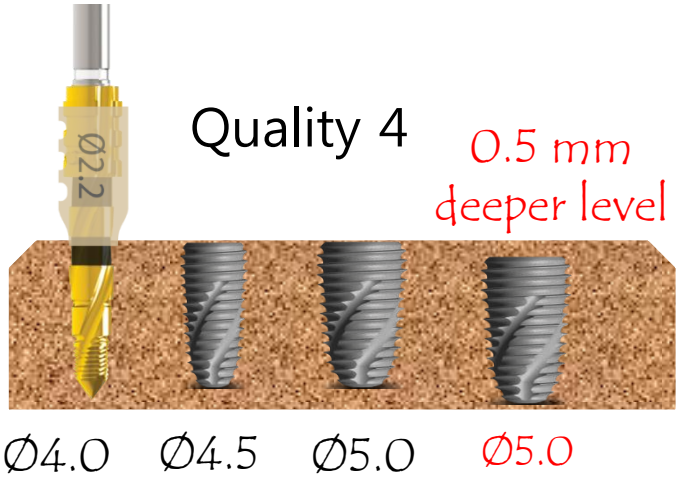


Soft residual bone



Dense residual bone

Week Bone: Quality 4 / Maxillary Tuberosity



- No pumping action
- 0.5 mm deeper placement of fixture
- wider fixture than final drill

Level	Crestal level		-0.5 mm	
Debriment	with	without	with	without
Ø4.5	4.4	10.2	-	12.9
Ø5.0	11.6	19.9	14.1	24.5

Prosthesis: Composition

Submerged

Cement Retained Prosthesis

Cemented (2piece) | Angulated (2piece) | Milling (2piece) | Absolute (1piece) | Straight (1piece)

Screw Retained Prosthesis

Temporary (2piece) | Meta-G UCLA (2piece) | Plastic UCLA (2piece) | Straight Multiunit (2piece) | Anglulated

Overdenture Prosthesis

Locator (1piece) | Ball (1piece)

CAD/CAM Prosthesis

Scanbody | Premill (2piece) | Link (2piece)

Prosthesis: Composition

Internal

Cement Retained

Cemented (2piece)

Angulated (2piece)

Shoulder (1piece)

Solid (1piece)

Screw Retained

Meta-G UCLA (2piece)

Overdenture

Ball (1piece)

External

Cement Retained

Cemented (2piece)

Angulated (2piece)

Shoulder (1piece)

Screw Retained

Temporary (2piece)

Meta-G UCLA (2piece)

Plastic Sleeve (2piece)

Overdenture

Straight Multiunit

Angulated (2piece)

Ball (1piece)

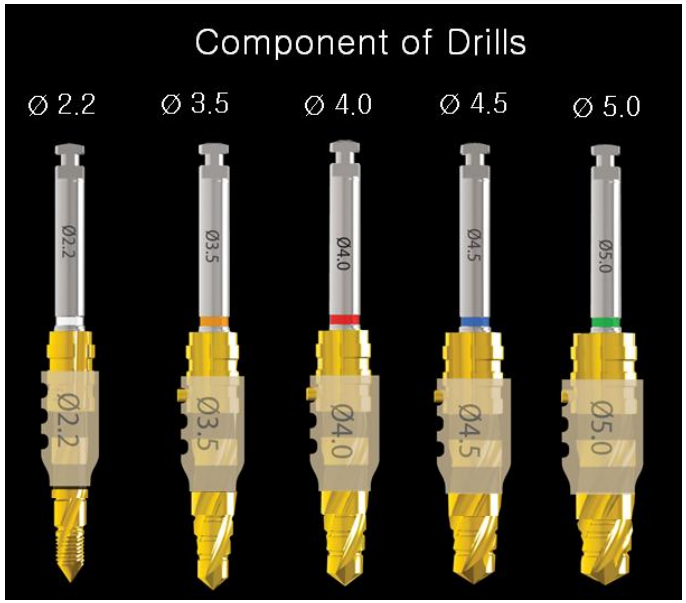
5. INNO Short Implant

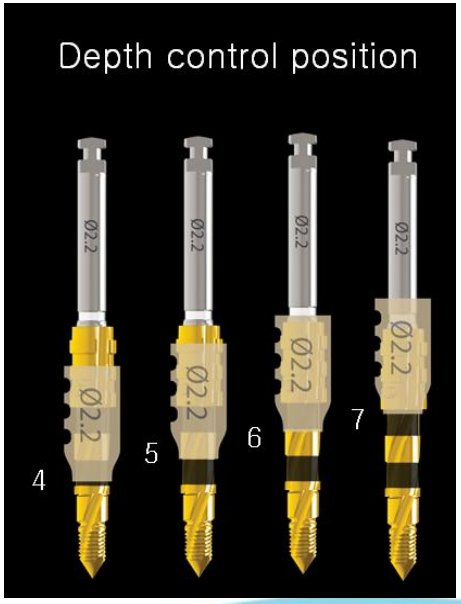
4~7 mm Control Depth

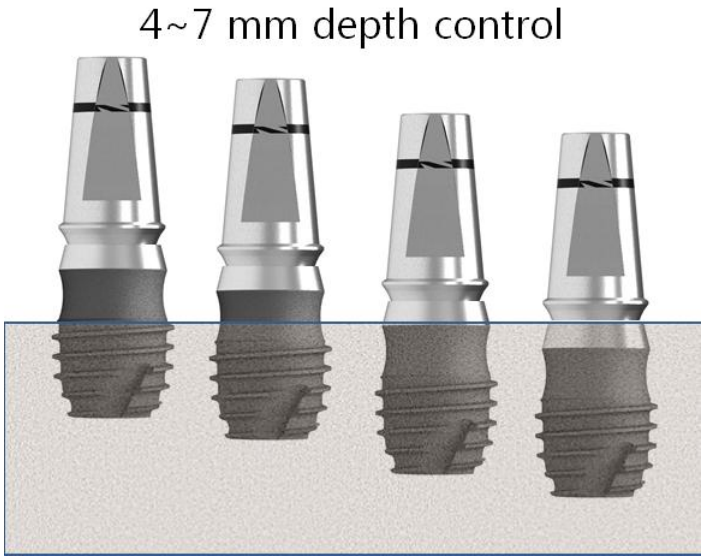
- 4~7 mm Depth Control Drill System
- Minimal Vertical Bone Augmentation

Double Platform Switching

- No Marginal Bone Change
- Atrophic Mandibular Posterior Ridge



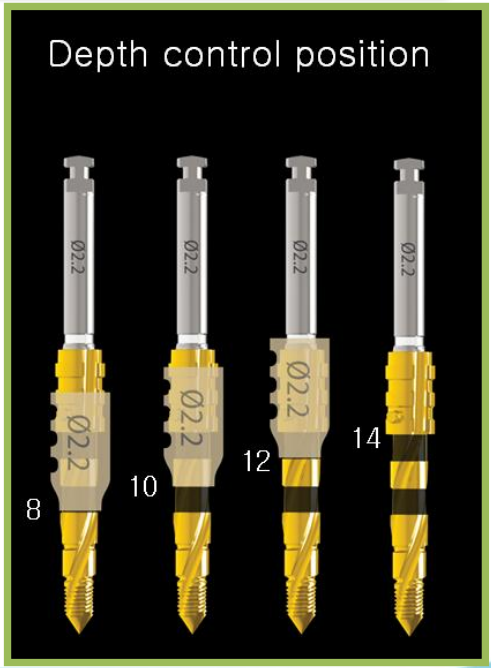




6. INNO Narrow Implant

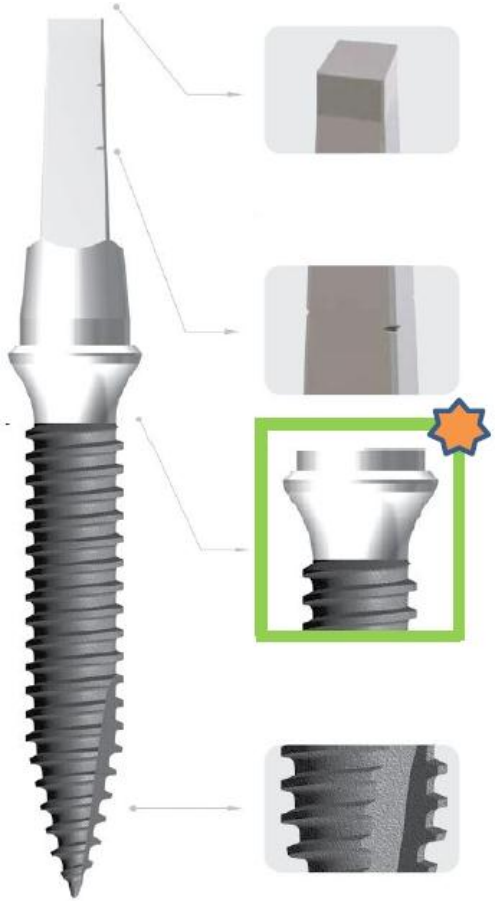
Diameter 3.3 mm • Mandibular Anterior teeth

Narrow Abutment • Diameter 3.5 mm Abutment



7. Miniplus Implant Systme

Cemented Type



Top Anti-Rotation Square

→ Promotes firm application of prostheses

Cutting Groove

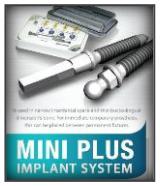
→ Two cutting grooves facilitates alteration of height

Non micro thread & Platform switching design

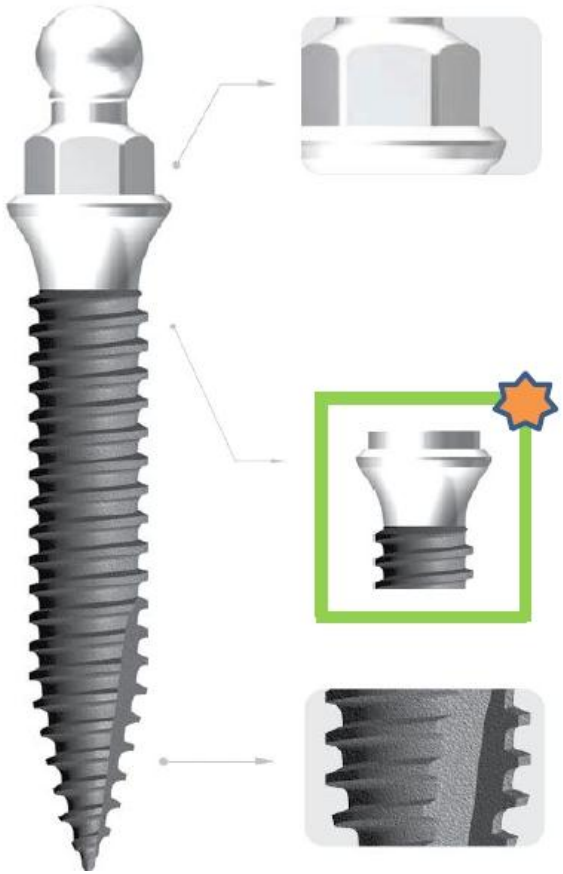
→ minimizes marginal bone loss by equal stress distribution into the whole body

Cutting Edge

→ Allows self-tapping & bone chip collection



Ball Type



Anti-Rotation Top

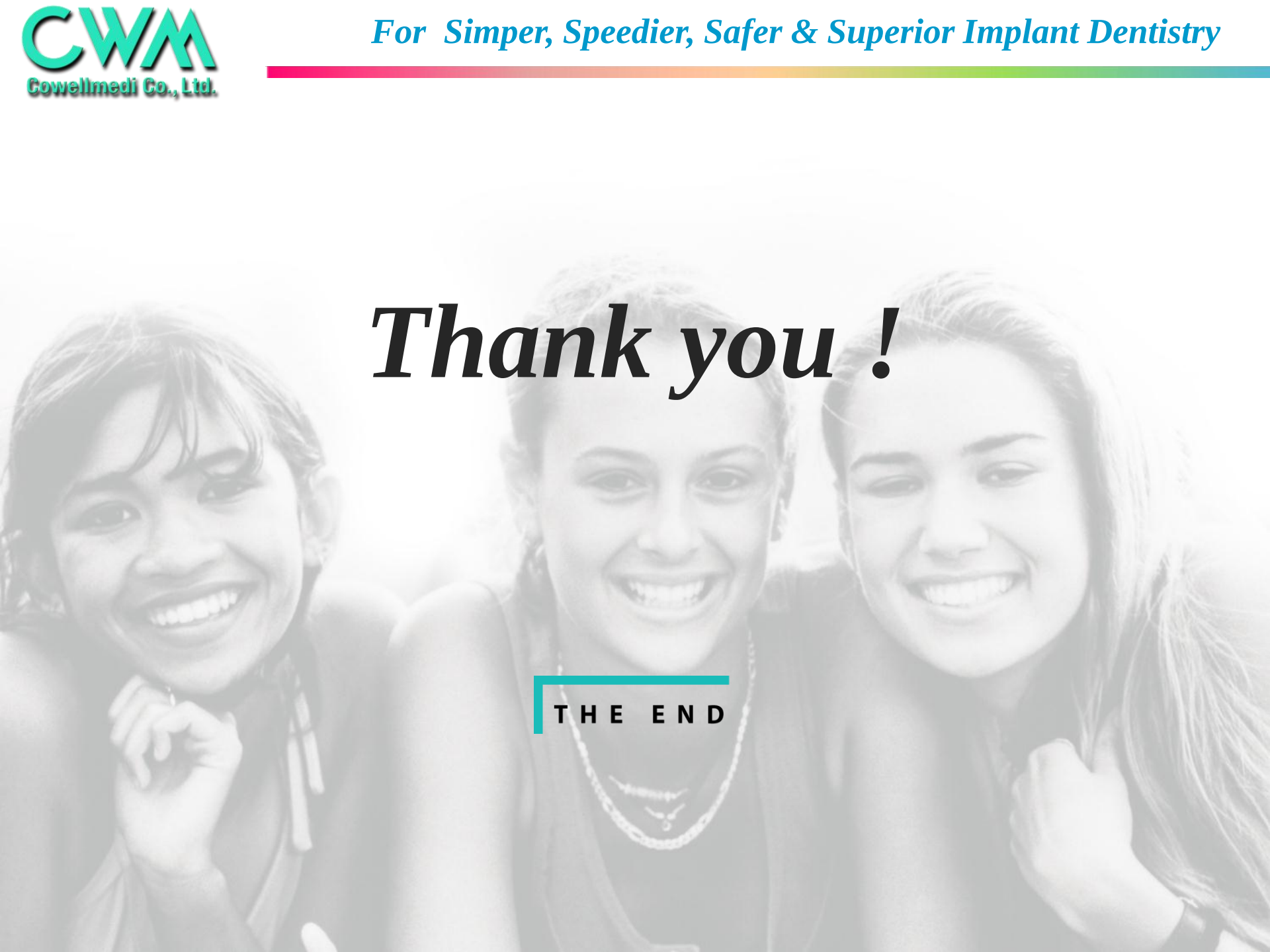
→ Promotes firm application of dentures & makes ball driver access easy

Non micro thread & Platform switching design

→ minimizes marginal bone loss by equal stress distribution into the whole body

Cutting Edge

→ Allows self-tapping & bone chip collection



Thank you !

THE END