Cowellmedi Implant System

Cowellmedi, the Pioneers in Dental Implant & rhBMP-2

For Simpler, Speedier, Safer & Superior Implant Dentistry

INNO Implant System®

Cowellmedi Co., Ltd.

www.cowellmedi.com

Cowellmedi Co., Ltd.

Since 1993

COWELL Medi - World’s Leader of Innovation in Bio-Technology
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2. Process Flow Chart
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1. History of Cowellmedi Implant System

- **1990’**
  - Late Placement
  - BIOPLANT
  - RBM surface

- **2000’**
  - Marginal bone change
  - ATLAS
  - ASD surface

- **2010’**
  - Immediate Placement
  - INNO
  - SLA surface
    - (Sandblast Large grit Acid etch)

- **2015’**
  - Immediate Placement
  - INNO
  - SLA-SH surface
    - (Sandblast Large grit Acid etched Super Hydrophilic)
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**

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

SLA-SH® : Roughness

Veeco
3-Dimensional Interactive Display

Surface Stats:
Ra: 1.80 um
Rq: 2.27 um
Rt: 10.49 um

Measurement Info:
Magnification: 19:93
Measurement Mode: VM
Sampling: 496.74 um
Amp Size: 640 X 480

Title: No. 5
Note: 3-1

Veeco
3-Dimensional Interactive Display

Surface Stats:
Ra: 1.95 um
Rq: 2.32 um
Rt: 19.03 um

Measurement Info:
Magnification: 19:93
Measurement Mode: VM
Sampling: 496.74 um
Amp Size: 640 X 480

Title: No. 5
Note: 3-2

Ra = 1.8 um
Why is Roughness of Surface Important?

- Proliferation of cells
- Enzyme activity of calcification
- Phago-cytosis activity of injury bone
- Remodeling of trabeculae

Nucleating and mineralizing ability of the implant surface
Why is Roughness of Surface Important?

Effect of Surface Roughness on Osteoblast


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

SLA®-SH
The Pioneers in Dental Implant & E.rhBMP-2
Effect of Surface Roughness on Osteoclast

<table>
<thead>
<tr>
<th>Short name</th>
<th>Treatment</th>
<th>$S_a$ (μm)</th>
</tr>
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<tbody>
<tr>
<td>TS</td>
<td>None</td>
<td>$(2.1 \pm 0.1) \times 10^{-3}$</td>
</tr>
<tr>
<td>TA</td>
<td>Hot acid etched</td>
<td>$1.33 \pm 0.05$</td>
</tr>
<tr>
<td>TLA</td>
<td>Sandblasted and hot acid etched</td>
<td>$2.60 \pm 0.30$</td>
</tr>
</tbody>
</table>

Comparison to other SLA Surface Treated Implants in market

SEM Photograph Analysis (Scanning Electron Microscope)
World's Cutting Edge Surface Treatment: Roughness Comparison to other SLA Surface Treated Implants in market

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

XPS Analysis (X-ray Photoelectron Spectroscopy)

The Pioneers in Dental Implant & E.rhBMP-2
## World’s First SLA-SH Surface made by dry Process

### Comparison to other SLA Surface Treated Implants in market

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Min.</th>
<th>Max.</th>
<th>Difference</th>
<th>Uniformity</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Cowellmedi</td>
<td>Ra = 1.59um~1.80um</td>
<td>Ra = 0.21um</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Ra = 1.48um~3.11um</td>
<td>Ra = 1.63um</td>
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<td>4</td>
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<tr>
<td>4</td>
<td>B</td>
<td>Ra = 0.61um~1.13um</td>
<td>Ra = 0.52um</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>Ra = 1.31um~2.65um</td>
<td>Ra = 1.34um</td>
<td></td>
<td>3</td>
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</tbody>
</table>

### 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 etching 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

SLA + Neutralization = 36°
⇒ Hydrophilic

Surface Energy Maximization

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 osseointegration

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

Biochemical and cell physiological processes of the implant surface

- Physicochemical properties
- Surface charge
- Surface energy
- Hydrophilicity

Nucleating and mineralizing ability of the implant surface

- Topography
- Macro-pore
- Micro-pore
- Surface Roughness (Ra)

Why is Hydrophilicity of Surface Important?

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

Inflammatory and connective tissue cells approach
Release of matrix proteins and selected adsorption of proteins

Biochemical and cell physiological processes of the implant surface
The effect of hydrophilic surface on Fibrinogen adhesion

Fibrinogen Alexa Fluor solution


Why is Hydrophilicity of Surface Important?
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.

Role of Hydrophilicity in Protein Remodeling of cells

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

<table>
<thead>
<tr>
<th>Sample</th>
<th>C1s</th>
<th>O1s</th>
<th>Ti2p</th>
<th>Si2p</th>
<th>N1s</th>
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<tr>
<td>A</td>
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<td>45.05</td>
<td>15.11</td>
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<td>46.49</td>
<td>15.22</td>
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<td>17.58</td>
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<tr>
<td>INNO</td>
<td>27.19</td>
<td>50.81</td>
<td>17.61</td>
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<td>N.D</td>
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</table>

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 Na₂SiO₂(OH)₂·4H₂O (water glass), which removed the other elements.

Researchers by KRISS (Korea Research Institute of Standards and Science)
World’s First SLA-SH Surface made by dry Process

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<td>4.67</td>
<td>N/D</td>
<td>N/D</td>
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</table>

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
Fixure: Outline Form

Outline Form

- Crestal Straight Portion
  : For maintain stress bearing

- Apical Tapered Portion
  : For anchoring in socket and bone

Crestal Straight Portion

Apical Tapered Portion

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 riping of sinus membrane
When INNOVATION meets Dental Implant

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.

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 losing 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.

INNO Implant System: Thread

- Secures initial 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
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
- 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

INNO SLA SURGICAL KIT

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).

Initial drill Guiding the pathway of final drill. Final drill is inserted a half into initial drill's hole without reduction of drill.
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

Ø4.9 Crestal cutter Ø3.3/2.8 Pilot Ø2.2 Path
Smart Surgical Kit: Composition

Drill
- Point Drill: KPD015
- Ø2.2 Drill: 2KTD02
- Ø3.5 Final Drill: 2KTD35
- Ø4.0 Final Drill: 2KTD40
- Ø4.5 Final Drill: 2KTD45
- Ø5.0 Final Drill: 2KTD50
- Ø6.0 Final Drill: 2KTD60

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

Extension & Driver
- Drill Extension: KDE02
- M. Fixture Driver L: 2KMM01L
- R. Fixture Driver L: 2KHDS01L
- 1.2 Hex Driver L: KHD1221
- 1.2 Hex Driver XL: KHD1227
- Torque Wrench: KTWC01

A simpler Kit for the first operation, applied to all length of implants with one drill & stopper

www.cowellmedi.com
Smart Kit: Minimal Drilling Sequence

Point Drill

Initial Drill

Final Drill

Implant Placement

When INNOVATION meets Dental Implant

The Pioneers in Dental Implant & E.rhBMP-2

www.cowellmedi.com
Smart Kit: Easy & Simple Access

Composition of Drill

Micro-Tap
- Automatic Intrusive Cutting Force
- Prevention of drill path change

Depth Control Stopper
- Easy Change of Depth
- Reduced Change of Drills
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 of fixture increases the initial torque force of fixture.

<table>
<thead>
<tr>
<th>Fixture placement level</th>
<th>Level</th>
<th>Crestal level</th>
<th>0.5 mm deeper level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>D1</td>
<td>D2</td>
<td>D3</td>
</tr>
<tr>
<td>Torque</td>
<td>34.1</td>
<td>29</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>44.4</td>
<td>38.4</td>
<td>19.1</td>
</tr>
</tbody>
</table>
Slopped edentulous ridge adjacent of tooth

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

12 mm drill

10 mm fixture

Crestal Flattening

Longer Final Drill
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

<table>
<thead>
<tr>
<th>Density</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Debriment</td>
<td>34.1</td>
<td>29</td>
<td>19.6</td>
</tr>
<tr>
<td>Debriment</td>
<td>30</td>
<td>25</td>
<td>15.4</td>
</tr>
</tbody>
</table>
• 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.
Week Bone: Quality 4 / Maxillary Tuberosity

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

<table>
<thead>
<tr>
<th>Level</th>
<th>Crestal level</th>
<th>-0.5 mm</th>
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<tbody>
<tr>
<td>Debriment</td>
<td>with</td>
<td>without</td>
</tr>
<tr>
<td>Ø4.5</td>
<td>4.4</td>
<td>10.2</td>
</tr>
<tr>
<td>Ø5.0</td>
<td>11.6</td>
<td>19.9</td>
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</table>
Prosthesis: Composition

Submerged

Cement Retained Prosthesis
- Cemented (2piece)
- Angulated (2piece)
- Milling (2piece)
- Absolute (1piece)
- Straight (1piece)
- Temporary (2piece)

Screw Retained Prosthesis
- Meta-G UCLA (2piece)
- Plastic UCLA (2piece)
- Straight Multiunit (2piece)
- Angulated (2piece)

Overdenture Prosthesis
- Locator (1piece)
- Ball (1piece)
- Scanbody (2piece)

CAD/CAM Prosthesis
- Premill (2piece)
- Link (2piece)
Prosthesis: Composition

**Internal**

<table>
<thead>
<tr>
<th>Cement Retained</th>
<th>Screw Retained</th>
<th>Overdenture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cemented</td>
<td>Meta-G UCLA</td>
<td>Ball</td>
</tr>
<tr>
<td>(2piece)</td>
<td>(2piece)</td>
<td>(1piece)</td>
</tr>
<tr>
<td>Angulated</td>
<td>Solid</td>
<td></td>
</tr>
<tr>
<td>(2piece)</td>
<td>(1piece)</td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1piece)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid</td>
<td>Meta-G UCLA</td>
<td>Ball</td>
</tr>
<tr>
<td>(1piece)</td>
<td>(2piece)</td>
<td>(1piece)</td>
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</tbody>
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**External**

<table>
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<th>Overdenture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cemented</td>
<td>Meta-G UCLA</td>
<td>Ball</td>
</tr>
<tr>
<td>(2piece)</td>
<td>(2piece)</td>
<td>(1piece)</td>
</tr>
<tr>
<td>Angulated</td>
<td>Plastic Sleeve</td>
<td></td>
</tr>
<tr>
<td>(2piece)</td>
<td>(1piece)</td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
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</tr>
<tr>
<td>(1piece)</td>
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<td></td>
</tr>
<tr>
<td>Temporary</td>
<td>Meta-G UCLA</td>
<td>Straight</td>
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<td>(2piece)</td>
<td>(2piece)</td>
<td>Multiunit</td>
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<tr>
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<td>(2piece)</td>
<td>(1piece)</td>
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</tr>
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<td>Shoulder</td>
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<td>Ball</td>
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<tr>
<td>(2piece)</td>
<td></td>
<td>(1piece)</td>
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</table>
5. INNO Short Implant

- 4~7 mm Depth Control Drill System
- Minimal Vertical Bone Augmentation
- No Marginal Bone Change
- Atrophic Mandibular Posterior Ridge

Component of Drills

<table>
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<th>Depth control position</th>
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<tr>
<td>4</td>
</tr>
</tbody>
</table>

4~7 mm depth control
6. INNO Narrow Implant

- Mandibular Anterior teeth
- Diameter 3.5 mm Abutment

Component of Drills
- Ø 2.2
- Ø 3.3

Depth control position
- 8 mm
- 10 mm
- 12 mm
- 14 mm

Ø 3.3 mm

CWM
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7. Miniplus Implant System

**Cemented Type**

- **Top Anti-Rotation Square**
  - Promotes firm application of protheses

- **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!