

• • •

I.

가

.14)

30

가

가

20%

가

.1)

.1)

가

가

가가

.15).

1960

30

Br nemark

가가

가

가

2 - 6).

가

가

가

.15 - 21).

가

4,7 - 13).

가

50 - 100

.22 - 24).

가  
(TiO<sub>2</sub>, Ti<sub>2</sub>O<sub>3</sub>, Ti<sub>3</sub>O<sub>4</sub>)

(TiO,

23),

가

가

(

, ) 3i  
Innovation, USA)

(Implant

25),

6%

4%

(Ti - 6Al - 4V)

가

가

가

(plasma spray coating)

II.

(sand blasting)

1.

가

1 6

3

Br nemark<sup>16)</sup>

1

(Mighty Dog, Frisies Co, USA)

Meffert

(

(1987)<sup>26)</sup>

(adaptive

, , )

osseointegration)

(biointegration)

Cleocin 300 mg( , )

가

1

2.

가

가

3.75mm,

7.0mm

가

가

I

( , ) II

3i

(Implant Innovation, USA)

27-35),

3.

(1) sodium pentobarbital(Tokyo Chemical Co., Japan)

Villaneuva bone stain 3  
4 70% 3  
, 100% 3 , Xylen , 95%  
3 , 100% 1

1, 2, 3, 4

Osteo - Bed Bone Embedding Media(Polyscience, Inc., USA) Osteo - Bed resin solution 6 , Osteo - Bed resin solution - catalyst mix 6 , Osteo - Bed catalyst mix 6

가

1

37 3  
2

(2)

(Crystal cutter, Maruto, Japan) 500µm

가

sodium pentobarbital

1: , Canadian balsam

80000 epinephrine 2 %

( , )

1

III.

10 mm

20 mm

2

1. I

3i(Implant Innovation, USA)

(1) 4

( , )

(Figure 1,

(3)

x100).

가

4 , 8 , 12

가

sodium pentobarbital

1/3

0.1 M phosphate buffer

(Figure 1a, x200).

2.5% glutaraldehyde

가

(2)

8

1

가

가 가

36).

가 (Figure 2 x100, Figure 2a (Figure 7, x100), (Figure 7a, x200).  
 x200)

(3) 12

IV.

(osteon) (Figure 3, 가  
 x100 - , Figure 3a, x200).

가

가 (Figure 4, x40)

가

4a, x100, - (Figure 2,22,37).  
 ).

2. II

(1) 4 1969 Br nemark

x100). (Figure 5, 가 가 가  
 가 가 2,22,38).

(Figure 5a, x200).

Br nemark fixture

(2) 8

Ti:99.75 %, Fe: 0.05%, O:0.10%, N:0.03%, C:0.03%, :0.06%

4 가

50 - 100

(Figure 6, x100).

22,23,24)

가

6a, x200).

(Figure

titanium(90) - aluminum(6) - vanadium(4) Cobalt - chromium - Molybdenum - based alloy, Iron - chromium - nickel - based alloy, Zirconium, Tantalum, gold, Platinum

(3) 12

39).

가

가

40).

1 mm

. 1mm

가

가

가

가

가

가

(biotolerant),  
(bioactive)

(bioinert),

2).

100%

polymethylmethacrylate(PMMA)

Albrektsson(1987)<sup>41)</sup>

Johansson

1

(fibrous tissue)

3

50%, 6

65%, 1

85%

4 , 8 , 12 가

, 3i

39).

가

가 가

(bioinert)

가

(bioactive)

가

가

가

8

3i

ASTM(American Society for  
Testing and Materials) Grade 3 Grade 2

가

12

가

V.

I 12

(osteon)

1 6

3

가

) 3i  
USA)

(  
(Implant Innovation,  
4 , 8 , 12

10 mm

가

. Buser (1990)<sup>42)</sup>

1.

가

12

2.

가

8

3.

8, 12

가

가

12

4,

가

4.

가

3i

가 가

가

가 가

VI.

가

가

1. Misch, C. E. : Contemporary  
Implant dentistry, Mosby Co. pp3 - 17.  
1993.

2. Br nemark, P - I. :  
Osseointegration and its experimental

가

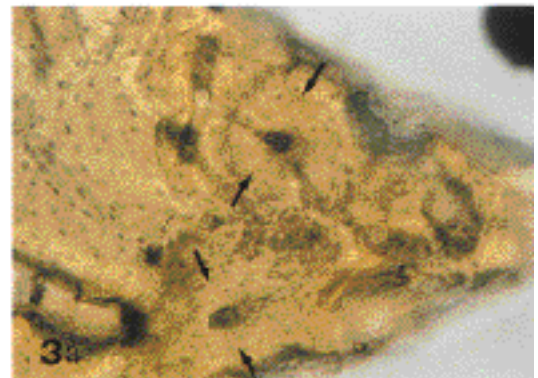
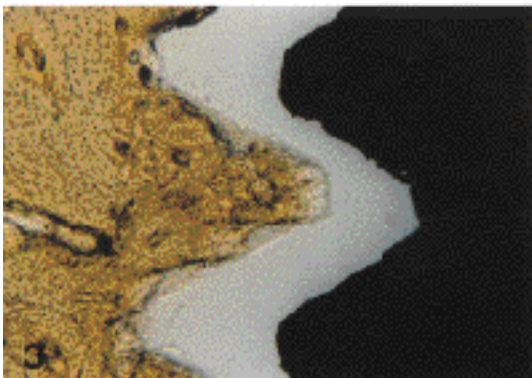
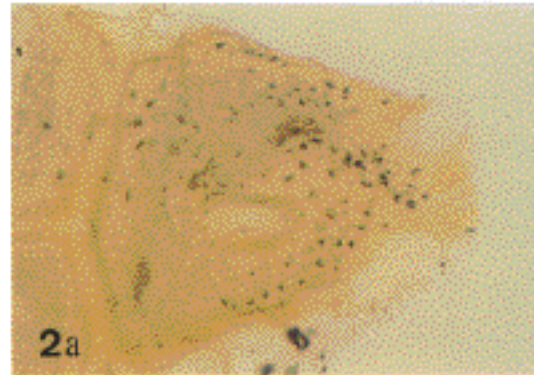
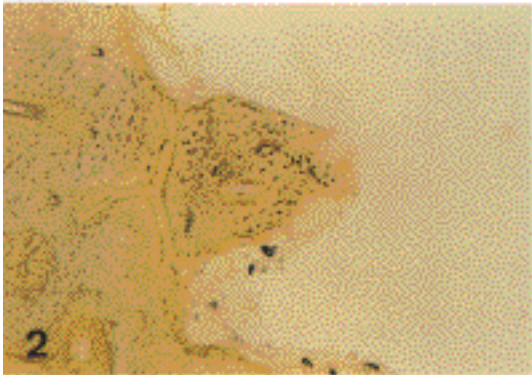
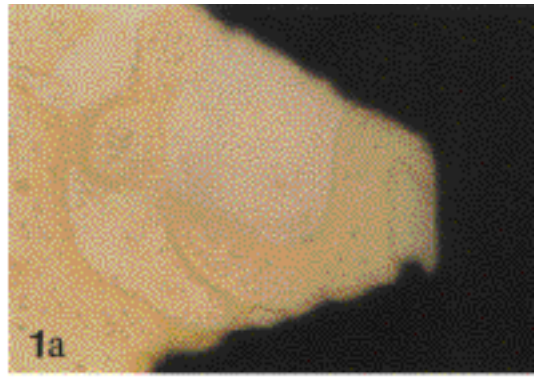
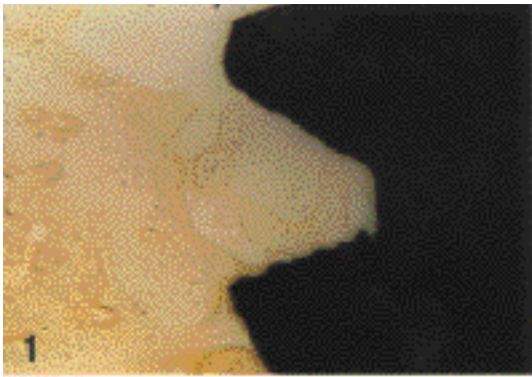
- background. *J. Prosthet. Dent.*, 50:399 - 410, 1983.
3. Sullivan, D. : A solution for the prosthetic problem of the hemidentate arch - tissue integrated prosthesis, *Int. J. Periodont. Rest. Dent.*, 6:67 - 81, 1986.
  4. Adell, R., Lekholm, U., Rockler, B., and Br nemark, P - I. : A 15 - year study of osseointegrated impalnts in the treat - ment of the edentulous jaw. *Int. J. Oral. Surg.*, 10(6):387 - 416, 1981.
  5. Adell, R. : Clinical results of osseointegrated impalnts supporting fixed prosthesis in edentulous jaws. *J. Prosthet. Dent.*, 50:251 - 270, 1987.
  6. Adell, R., Ericksson, B., Lekholm., Br nemark, P - I., and Jemt, T. : A long - term follow - up study of osseointegrated implants in the treatment of totally edentulous jaws. *Int. J. Oral. Maxillofac. Implants.*, 5:347 - 359, 1990.
  7. Br nemark, P - I., Svensson, B., and van Steenberghe, D. : Ten - year survival rates of fixed prostheses on four or six implants ad modum Br nemark in full edentulism. *Clin. Oral. Impl. Res.*, 6:227 - 231, 1995.
  8. Zarb, G. A., and Schmitt ,A .: The longitudinal clinical effectiveness of osseointegrated dental implants. The Toronto Study: Part 1. Surgical result., *J. Prosthet. Dent.*, 63:451 - 457, 1990.
  9. Saadoun, A. P., and LeGall, M, L. : Clinical results and guidelines on Steri - Oss endosseous oral impalnts, *Int. J. Periodont. Rest. Dent.* 12:487 - 499, 1992.
  10. Henry, P. J., Tolman, D. E., and Bolender, C. H. : The applicability of osseointegrated implants in the treat - ment of partially edentulous patients: Three years result of a prospective multicenter study, *Quintessence Int.*, 24:123 - 129, 1993.
  11. Van Steenberghe, D., Klinge, B., Linden, U., Quirynen, M., Herrmann, I., and Garpland, C. : Periodontal indices around natural and titanium abutments : A longitudinal multi - center study, *J. Periodontol.* 64:538 - 541, 1993.
  12. Van Steenberghe, D., Bolender, C., Herrmann, I., and Linden, U. : The applicability of osseointegrated oral implants in the rehabilitation of partial edentulism: A prospective multicenter study on 558 fixtures. *Int. J. Oral. Maxillofac. Implants.*, 5:272 - 282, 1990.
  13. Bahat, O. : Treatment planning and placement of implants in the posterior maxillae: Report of 732 consecutive Nobelpharma implants. *Int. J. Oral. Maxillofac. Implants.*, 8:151 - 161, 1993.
  14. Kinni, M., Hokama, N., and Caputo, A. A. : Force transfer by osseointegration implants devices. *Int. J. Oral Maxillofac. Implants.*, 2:11 - 14, 1987.
  15. Hobo, S., Ichida, E., and Garcia, L. T. : Osseointegration and Occlusal Rehabilitation. *Quintessence Co.* pp21 - 32. 1989.
  16. Br nemark, P - I, Zarb, G. A., Albreksson, T. : Tissue integrated prosthesis. osseointegration in clinical dentistry. Chicago:Quintessence Publishing Co., Inc., 1985.
  17. Gottlander, M., and Albrekttsson, T. : Histomorphometric studies of hydrox - ylapatite - coated and uncoated CP tita -

- nium threaded implants in bone. *Int. J. Oral. Maxillofac. Implants.*, 6; 399 - 404, 1991.
18. Gottlander, M., and Albrektsson, T. : A Histomorphometric study of unthreaded hydroxyapatite coated and titanium coated implants in rabbit bone. *Int. J. Oral. Maxillofac. Implants.*, 7:485 - 490, 1992.
  19. Denissen, H. W., Kalk, W., Nieuport H. M., Maltha, J. C., and Hoofe, A. : Mandibular bone response to plasma-sprayed coatings of hydroxyapatite. *Int. J. Prosthodont.*, 3: 53 - 58, 1990.
  20. Oonishi, H. Yamamoto, M., Ishimura, H. Tsuji, E., Kushitani S., Aono, M., and Ukon, Y : The Effect of Hydroxyapatite coating on Bone Growth into porous titanium alloy implants. *J. Bone. Joint. Surg.*, 71 - B:213 - 216, 1989.
  21. Wennerberg, A., Ektessabi, A., Albrektsson, T., Johansson, C., and Andersson, B. : A 1 - year follow - up of implants of differing surface roughness placed in rabbit bone. *Int. J. Oral.. Maxillofac. Implant.*, 12:486 - 494, 1997.
  22. Albrektsson, T. : Direct bone anchorage of dental implants. *J. Prosthet. Dent.*, 50:255 - 261, 1983.
  23. Kasemo, B. : Biocompatibility of titanium implants: Surface science aspects, *J. Prosthet. Dent.*, 49:832 - 837, 1983.
  24. Parr, G. R., Gardner, L. K., Toth, R. W. : Titanium: The mystery metal of implant dentistry. *Dental materials aspects. J. Prosthet. Dent.*, 54:410 - 413, 1985.
  25. Albrektsson, T., Br nemark, P - I., Hansson, H - A., and Lindstorm, J. : Osseointegrated Titanium Implants. Requirements for ensuring a long - last - ing direct bone - to - implant anchorage in man. *Acta. Orthop. Scand.*, 52:155 - 170, 1981.

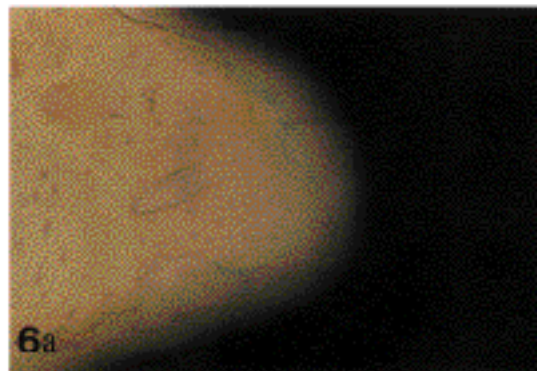
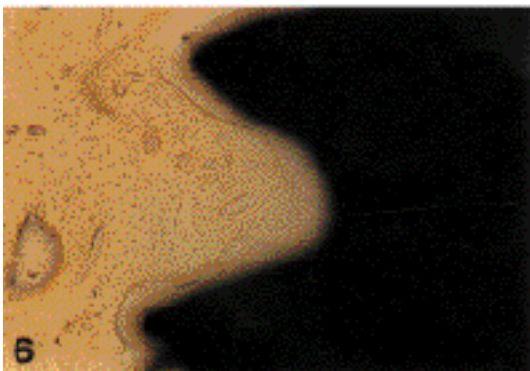
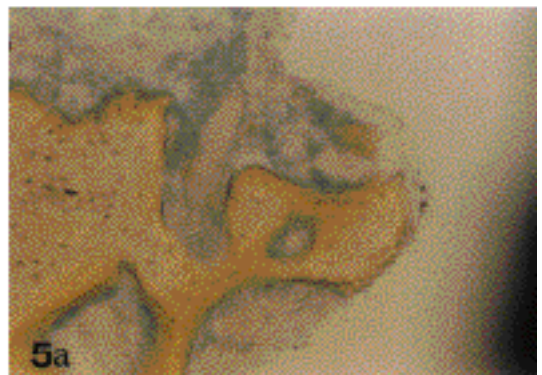
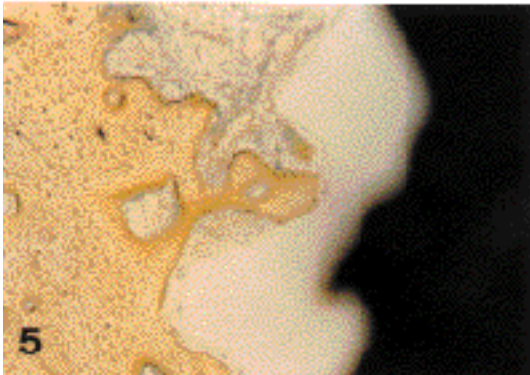
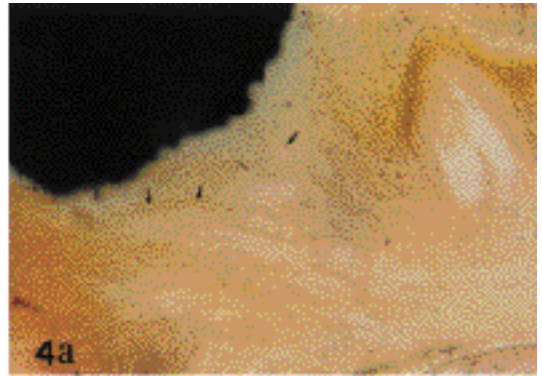


26. Meffert, R. M., Block, M. S. Kent, J. N. : What is osseointegration?, *Int. J. Perio. Restorative. Dent.*. 4:9 - 21, 1987.
27. Dahlin, C., Lekholm, U., and Lindhe, A. : Membrane - induced bone augmentation at titanium implants. A report on ten fixtures followed from 1 to 3 years after loading. *Int. J. Periodont. Rest. Dent.*, 11: 272 - 281, 1991.
28. Parel, S. M., and Triplett, R. G. : Immediate fixture placement: A treatment planning alternative. *Int. J. Oral. Maxillofac. Implants.*, 5:337 - 345, 1990.
29. Duncan, J. M. and Westwood R. M. : Ridge widening for the thin maxilla: A clinical report. *Int. J. Oral. Maxillofac. Implants.*, 12:224 - 227, 1997.
30. Schnitman, P. A., Wohrle, P. S., Rubenstein, E. , Da Salva J. D., and Wang, N - H. : Ten - year results for Br nemark impalnts immediately loaded with fixed prosthesis at implant placement. *Int. J. Oral. Maxillofac. Implants.*, 12;495 - 503, 1997.
31. Adell, R., Lekholm U. Grondahl, K., Br nemark, P - I., Lindstrom, J., and Jacobsson, M. : Reconstruction of severely resorbed edentulous maxillae using osseointegrated fix - tures in immediate autogenous bone grafts. *Int. J. Oral. Maxillofac. Implants.*, 5: 233 - 246, 1990.
32. Becker, W., Becker, B. E., Polizzi, G., and Bergstorm, C. : Autogenous bone grafting of bone defect adjacent to implants placed into immediate extraction sockets in patients : A prospective study. *Int. J. Oral. Maxillofac. Implants.*, 9:389 - 396, 1994.
33. Fritz, M. E., Malmquist, J., Koth, D., Jeffcoat, M., Hardwick, R. Braswell, L. D. and Lemons, J. : The use of guided bone regeneration fill large mandibular defects in mon - keys: A pilot study, *Int. J. Oral. Maxillofac. Implants.*,9:644 - 652, 1994.
34. Ellegaard, B., Baelum, V., and Karring, T. : Implant therapy in periodontally compro - mised patients. *Clin. Oral. Impl. Res.*, 8:180 - 188, 1997.
35. Williamson, R. A. : Rehabilitation of the resorbed maxilla and mandible using auto - genous bone grafts and osseointegrated implants, *Int. J. Oral. Maxillofac. Implants.*, 11:476 - 488, 1996.
36. Donath, K., and Breuner, G. A. : A method the study of uncalcified bones and teeth with attached soft tissue, *J. Oral. Pathol.*, 11:318 - 326, 1982.
37. Carlsson, L., Rostlund, T., Albrektsson, B., Albrektsson, T., and Br nemark, P - I. : Osseointegration of titanium implants. *Acta. Orthop. Scand.*, 57:285 - 289, 1986.
38. Zarb, G. A. : Introduction to osseointegration in clinical dentistry. *J. Prosthet. Dent.*, 49: 824. 1983.
39. Misch, .E. C. : Contemporary implant dentistry. Mosby Co. pp259 - 278, 1993.
40. Block, M. S., and Kent, J. N. : Endosseous implants for maxillofacial reconstruction, *W. B. Saunders.*, 40 - 69, 1995.
41. Johansson, C., and Albrektsson, T. : Integration of screw implants in the rabbit; a 1 - year follow - up of removal torque of titanium implants. *Int. J. Oral. Maxillofac. Implants.*, 2:69 - 75, 1987.

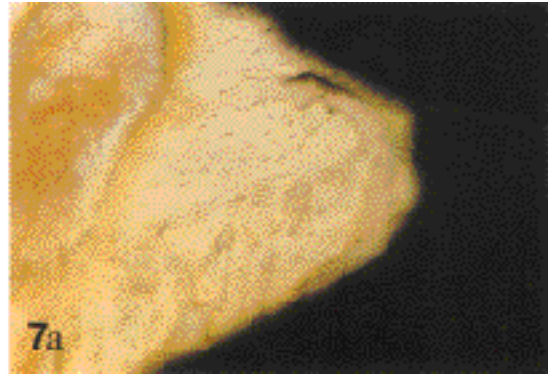
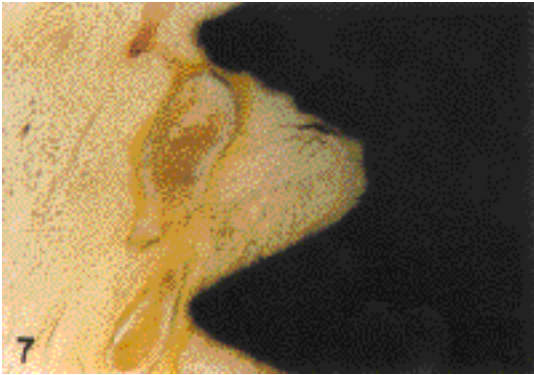
(1)



(II)



( III )



42. Buser, D., Warrer, K., Karring, T., and Stich, H. : Titanium implants with a true periodontal ligament ; An alternative to osseointegrated implants ?, Int. J. Oral. Maxillofac. Implants., 5: 113 - 116, 1990.

Figure 1. Histologic features 4 weeks after implant installation( Test Group I)

1 : Trabecular bone formed from the surface of osteotomy surface. Direct contact in part between the implant surface and the bone. x100

1a: Note the osteoblasts and osteocytes in the trabecular bone.

Inter - thread space filled with the trabecular bone in part.

Note the osseointegration in part. x200

Figure 2 : Histologic features 8 weeks after implant installation( Test Group I)

2, 2a : Note the bone maturation the unification of each trabecula.

Inter - thread space almost filled with bone. Note the osteocytes more than the osteoblasts in number. x200

Figure 3 : Histologic features 12 weeks after implant installation.( Test Group I)

Note the osteon(arrow). x200

Figure 4 : Histologic features 12 weeks after implant installation

4 : Note the newly - formed periodontal ligament toward the implant surface. x40

4a : Note the fiber orientation parallel to the implant surface.(arrow). x100

Figure 5 : Histologic features 4 weeks after implant installation.( Test Group II)

5: Inter - thread space filled with the newly - formed trabecular bone and loose connective tissue. No inflammatory cells. x100

5a : Note the osteoblasts and osteocytes in the trabecular bone. x200

Figure 6 : Histologic features 8 weeks after implant installation.( Test Group II)

6 : Note the increase of newly - formed bone in amount and the bone maturation.

x100

6a : Note the numerous osteocytes and the few osteoblasts. x200

Figure 7 : Histologic features 12 weeks after implant installation( Test Group II)

7 : Inter - thread space filled with the mature compact bone. x100

7a : No osteon. x200.



- Abstract -

## Tissue Responses Around Two Types of Dental Implant in Beagle Dog

Hyung - Geun Chung, Young - Hyuk Kwon,  
Man - Sup Lee, Joon - Bong Park  
Dept. of Periodontology, College of  
Dentistry, Kyung Hee University

Three beagle dogs aged over one and half years were used in this study. All mandibular premolars were carefully extracted. Two AVANA implants(Sumin, Korea) and two 3i implants(Implant Innovation, USA) were installed at each right and left side respectively. Each dog was sacrificed at 4, 8, 12 weeks.

Non - decalcified specimens were made and stained for a light microscopic study.

The results were as follows ;

1. Inflammation was not observed in the area of bone tissue adjacent to the implant body.
2. With time, quantity of osseointegration increased in each type of dental implant. There was no difference between AVANA implant and 3i implant.
3. Maturation of the bone around each type of the dental implant increased with time. 12 weeks after

implant installation, the bone around dental implant represented compact bone - like appearance.

4. In case implants were located adjacent to a root, newly - formed periodontal ligament tissue was observed around the implant. And the direction of the periodontal ligament fiber was parallel to the surface of the implant.

Within the results of this study, AVANA implants represented similar osseointegration in comparison with 3i implants.