

, , ,

I.

5, 6).

Polson 7)
progenitor cell

.

가

8).

가 1, 2)

12)

13 - 20)

21 - 26)가

가 2). Adriaens 3, 4)

가

27 - 33)

. Moore 29)

1 가

99% 가 가

5)

Smart 30)

. , McCoy 31)

, Pameijer 24)

(retoxification)가

citric acid 32)

33).

가

가

34, 35)

bur

. Cheetham 36)

가

가

Fukazawa 37)

11, 12, 33).

II.

가

1.

38-45)가

1997 3

8

(roughness)가 가

(surface free - energy)

가 46, 47)

11 ,

39 (16 , 12) 46

65

가

48, 49)

, Quirynen Bollen 46)

가

3-5

Meyer Lie

50)

(manual instrument)

2.

(1) 30 (13 , 8 , 9) 1/3 , 30 (7 x 5mm) .
 1 (GC) Gracey curette No.11/12(Hu - Friedy Co.) ,
 2 (US) ultrasonic scaler(Cavitron /Dentsply MODEL 3000TM UNIT, 30K - 10 insert) 3 (BUR) rotating root planing bur(Perio Set , 40µm & 15µm grit size, Swiss Dental Products) 10

가 : 4 (GC+ rubber cup polishing : GC+P) , 5 (US+ rubber cup polishing : US+P) . 30
 (2) .
 (Electronic Balance, Chyo Balance Co., KYOTO, JAPAN) . 1, 2, 3 , 1, 2 30 가 4, 5

GC

(3) , diamond wheel disk - 5 x 5 x 2mm debris 30 15 ultrasonic cleaner (BioSonic UC300, Whaledent) .

(4) (surface roughness)

1 Experimental group design

Groups	Root planing method	S a m p l e size
1	Gracey curette	10
2	Ultrasonic scaler	10
3	Rotating root planing bur	10
4	GC+ rubber cup polishing	10

50 . US BUR flame - shaped diamond root planing bur 40µm, 15 µm bur 30 . 4, 5 1, 2 , 1, 2 (Zircate Prophy Paste, Dentsply) 30

Form Talysurf(Rank Taylor - Hobson, England :) 5 5 oneway ANOVA(Student 's t - test

1 Mean loss of tooth substance of experimental groups

Groups	M e a n
loss(mg)	
1 (Gracey curette)	7.0 ± 1.09
2 (Ultrasonic scaler)	1.3 ± 1.00
3 (Rotating root planing bur)	5.8 ± 1.72
4 (GC + rubber cup polishing)	8.7 ± 1.34

Mean ± S.D(n=10)

2 Mean surface roughness values of experimental groups

Groups	Mean surface roughness	
	Ra(μm)†	Rt(μm)‡
1 (GC)	0.34 ± 0.06*	2.46 ± 0.22
2 (US)	2.09 ± 0.06*	14.06 ± 0.62
3 (BUR)	0.47 ± 0.04*	3.58 ± 0.23
4 (GC + P)	0.34 ± 0.04*	2.02 ± 0.08
5 (US + P)	1.65 ± 0.36*	8.89 ± 1.22

Mean ± S.D(n=5)

† Ra : Average surface roughness(an arithmetic mean of the departures of the profile from the mean line)

‡ Rt : Maximal peak - to - valley height.

* : Significant difference by oneway ANOVA

(5)

9 (3 , 3 , 3) 15
 3
 2% glutaraldehyde(0.1M
 cacodylate buffer, pH 7.4) 4
 24
 (criti - ion
 sputting coater gold palladium
 20kv
 (T330A, JeoL Co., Japan)

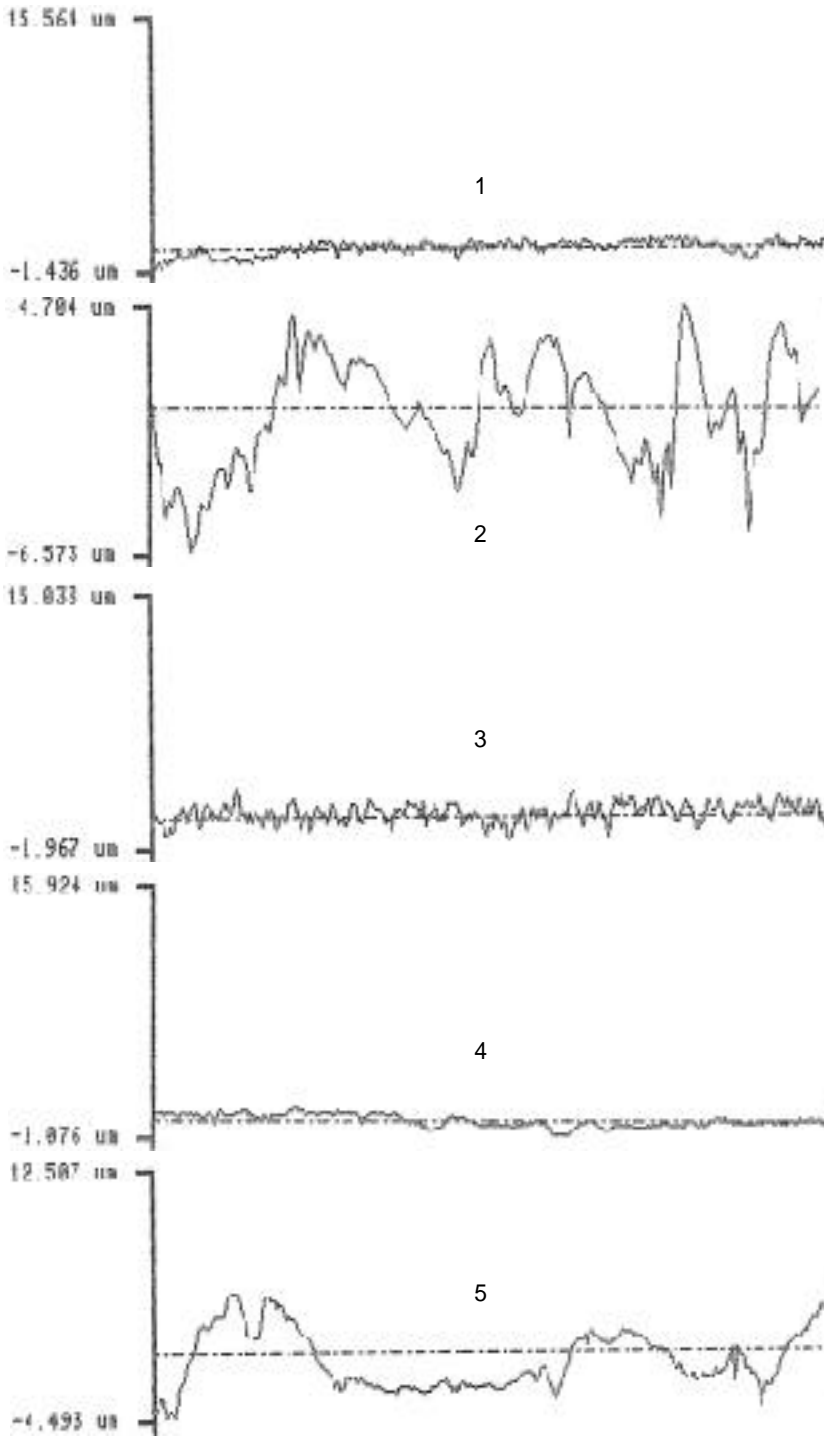
III.
 1.
 10 50
 1 (GC) 7.0 ± 1.09mg
 ,
 가 4 (GC + P) 8.7 ±
 1.34mg
 3 (BUR) 5.8 ± 1.72mg
 2 (US), 5 (US + P)
 1.3 ± 1.00mg, 4.5 ± 1.68mg

3 Test of significance for mean surface roughness values of each other group

	1	2	3	4	5
1					
2	*				
3	*		*		
4	**		*		*
5	*		*		*

* : Significant difference by Student t - test (P<0.05)

** : Non - significant difference by Student t - test (P>0.05)



1 The root surface roughness profiles of experimental groups

3.

(rubber cup polishing)

1, 4 1.7 ± 0.90mg, 2, 5
3.2 ± 0.97mg
4, 5

(1) 1 : Gracey curette
(2 - 6)

1, 2 (. 2, 3).
scale - like

2.

2 (2, 3, 4).

Ra, Rt

가

1

1 (GC) Ra=0.34 ± 0.06µm,
Rt=2.46 ± 0.22µm , 2 (US)

(5, 6).

Ra=2.09 ± 0.06µm, Rt=14.06 ± 0.62µm

(2) 2 : Ultrasonic scaler

가 . Bur 3
Ra=0.47 ± 0.04µm, Rt=3.58 ± 0.23

(7 - 11)

µm , 4 (GC + P) Ra=0.34 ±
0.04µm, Rt=2.02 ± 0.08µm 가

(7)

. 5 (US + P) Ra=1.65 ± 0.36
µm, Rt=8.89 ± 1.22µm 4 ,

(8, 9).

hammering movement

1 , 3 , 5 , 2

oneway

ANOVA

P<0.05, P<0.01

(10, 11).

가

(3) 3 : Rotating root planing bur

가 (12 - 16)

Student t - test

, 1

4

가

(12, 13, 14).

(P<0.05).

3 bur

(15,

16).

가 .

(4) 4 : GC + rubber cup polishing
(17 - 19)

가

, Meyer

Lie 22, 50)

(17,

18). ,

1

가

. . ,

가

(19).

가

.

(5) 5 : US + rubber cup polishing
(20 - 22)

,

O Leary 34)

Moskow 39)

2

가

(

20).

,

가

(21, 22).

.

IV.

(profiles)

pro -

filometer

42, 44, 50)

50)

가

가

가

.

13, 28, 43, 55).

19)

Checchi 28)

14)

39)

21 - 26)

가

Stewart 13)

가

, Hunter 38)

Moskow

Bressman³⁹⁾

gouging

hammering movments

22)

24)

Meyer Lie 22, 50)
mond bur가 가

dia -

bur

dia -

Stewart 14)

가

mond bur

rotary instrument

Ritz 16)

22)

diamond bur

diamond bur 가
가

Stewart 14), Ritz 16)

7.0 ±

bur

1.09mg 가

, bur

가

가

22)

bur
가

Wilkinson

Maybury²¹⁾, Lie Meyer 22), D Silva 23)

diamond bur

가 20)

1 - 4 μ

cuticle

1, 26, 37)

22)

gouging

21, 25, 39)

42, 44, 50)

Wilkinson Maybury²¹⁾, Garnick 25)

Quiryrenen 46, 47)

가

가

Ash⁴⁸⁾ 46, 47), Rosenberg (P<0.05). 가

가

diamond bur

, Leknes⁴⁰⁾

, Schwarz⁴¹⁾

Oberholzer⁴⁵⁾ 가

가

Leknes Lie⁴²⁾ 가

vivo⁴⁴⁾ , in scale - like , diamond

bur 가

diamond

7).

24, 39) Meyer Lie⁵⁰⁾ rotary bur

21 - 23, 38, 43, 44, 50)

가 (Ra=0.34 ± 0.06 μm) bur

가 Ra=2.09 ± 0.06 μm

가

Belting Spjut¹⁹⁾, Wilkinson Maybury²¹⁾

Olson³²⁾

1M citric acid 5

가 .

가 1. 가

가 2. 가

stroke , 가 , 가

가 3. 가

가 4. (P<0.05).

가 가

bur 가 (P<0.05).

5. bur

V. bur

bur , , (P<0.05)

bur (P<0.05).

가

bur 가

VI.

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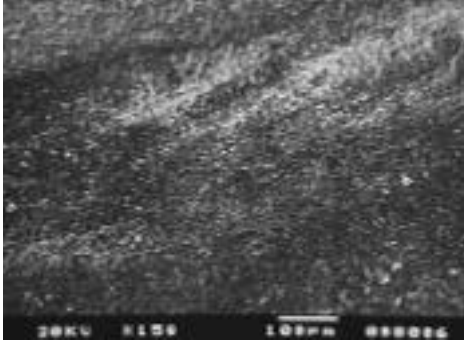
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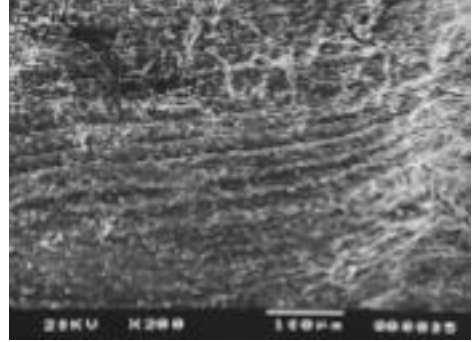
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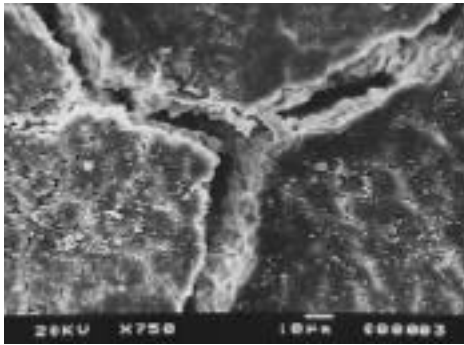
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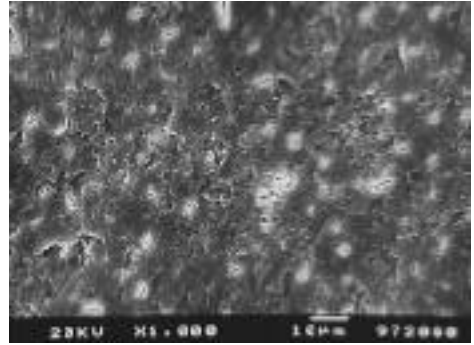
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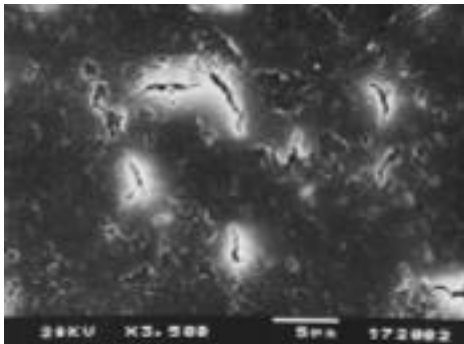
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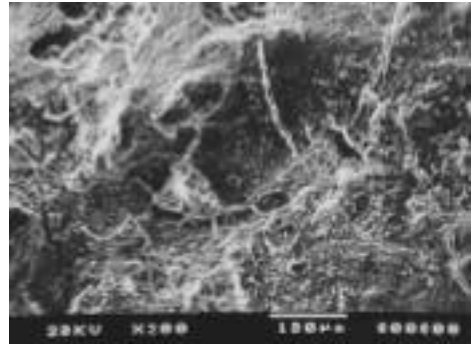
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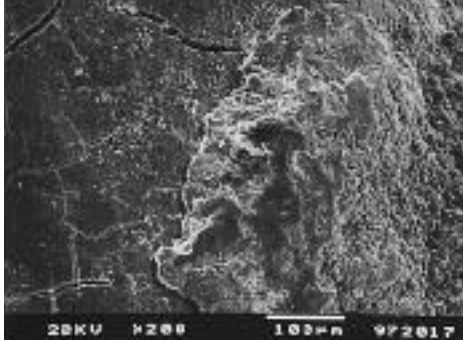


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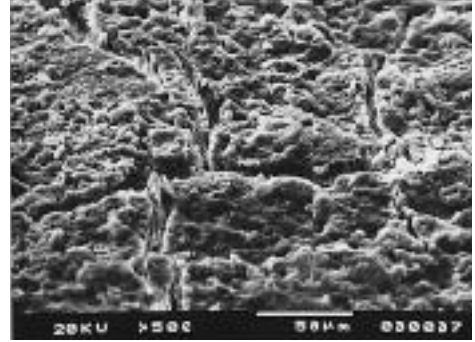


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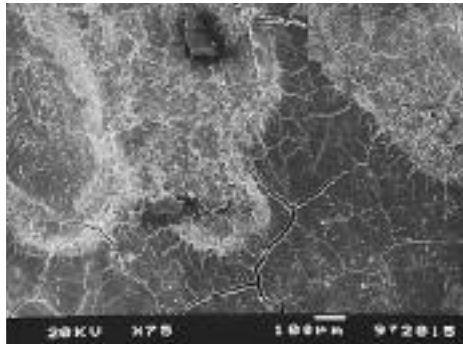
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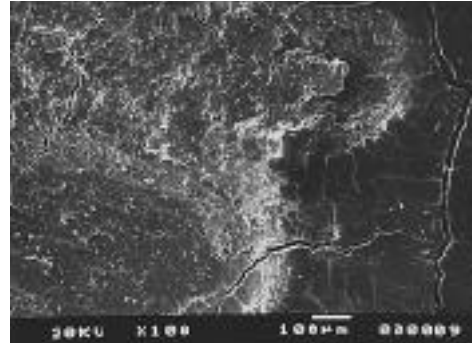
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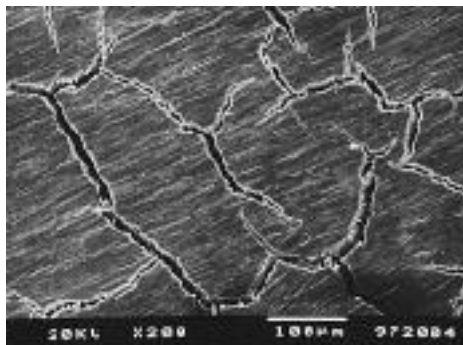
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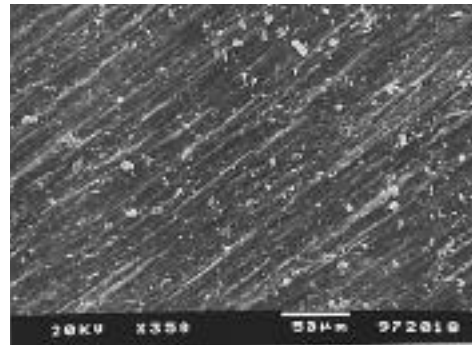
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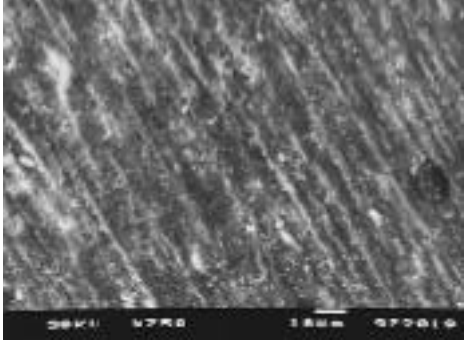


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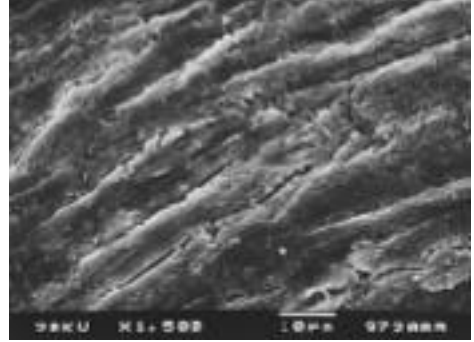


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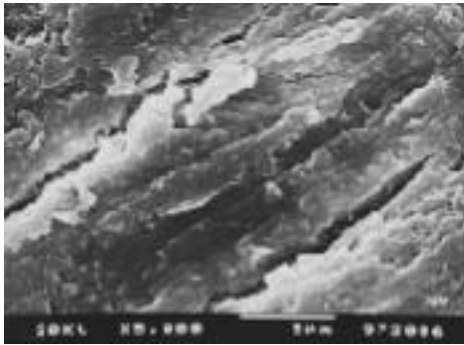
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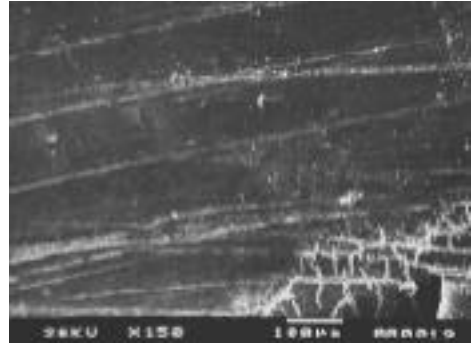
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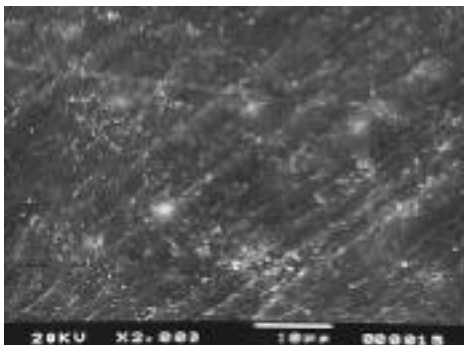
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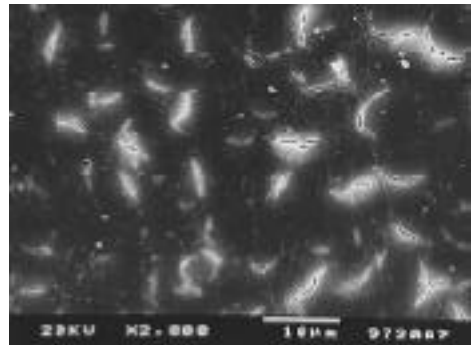
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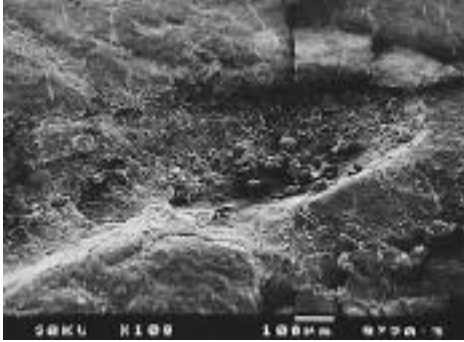


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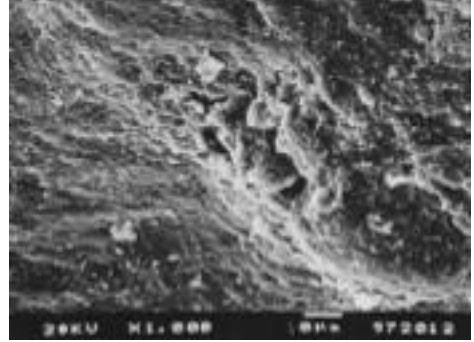


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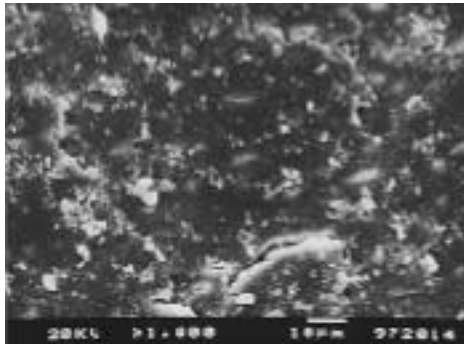
(IV)



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21



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1. Surface following root planing with Gracey curette

The curetted cementum shows a smooth surface and definite instrument marks produced by the curette strokes.

There is no evidence of remaining calculus. 2, 3 (× 150, × 200)

Instrumented surface exhibits an amorphous, scale-like appearance and slight grinding debris. 3, 4 (× 200, × 750)

In high magnification, an amorphous, irregular coating (smear layer) obscures the underlying dentinal tubule orifices. 5, 6 (× 1000, × 3500)

2. Surface following root planing with ultrasonic scaler

The cementum surface is composed of untouched area and instrumented area.

7 (× 200)

Relatively large amounts of calculus are seen at the right of this area and uninstrumented surface and remaining calculus shows rough surface. 8, 9 (× 200, × 500)

Considerable loss of tooth substance and gouging in root surface produced by ultrasonic tip. Adjacent areas show intact cementum and absence of a smear layer. 10, 11 (× 75, × 100)

3. Surface following root planing with diamond root planing bur

Instrumental marks and numerous grinding debris are clearly seen.

Flecks of residual calculus are not evident. 12, 13, 14 (× 200, × 350, × 750)

The surface shows heavily corrugated area with irregular instrumental marks.

15 (× 1500)

All cementum is removed and in high magnification, dentinal tubule orifices are exposed. Figs. 16 (× 5000)

4. Surface following root planing with Gracey curette plus rubber cup polishing

Smooth surface and definite instrumental marks is seen. 17 (× 150)

There is no evidence of residual calculus. In high magnification, dentinal tubule orifices are partially occluded by smear layer and polishing paste particles are scattered. 18, 19 (× 2000, × 2000)

5. Surface following root planing with ultrasonic scaler plus rubber cup polishing

Cavitation defect produced by ultrasonic scaler tip. 20 (× 100)

Rough surface had relatively large amounts of calculus and grinding debris, polishing paste particles.

21, 22 (× 1000, × 1000)

- Abstract -

A Study on the Loss of Tooth Substance and Surface Changes following Root Planing

Soo - Rye Heo, Soo - Ah Kim, Seok - Ran Seo, Hyoug - Seop Kim.

Department of Periodontology and Research Institute of Oral Bio - science, College of Dentistry, Chonbuk National University

The purpose of this study was to evaluate in vitro effects of the loss of tooth substance and root surface changes following root planing with various periodontal instruments.

The 39 extracted human teeth due to severe periodontal disease were included. The total 50 root surfaces of 30 teeth were root planed with following instruments : Group 1, with Gracey curette, Group 2, with ultrasonic scaler, Group 3, with rotating root planing bur, Group 4, with Gracey curette plus rubber cup polishing, and Group 5, with ultrasonic scaler plus rubber cup polishing. Following root planing, the amount of tooth substance loss was evaluated by measuring the weight of the removed tooth substance and then 5 specimens (5 × 5 × 2mm) were randomly selected from the each group for roughness measurement. Root planed areas of each

specimen were subjected to five measurements using the Profilometer and an average surface roughness values(Ra) for each group was obtained. Statistical difference for roughness values of each group was analyzed using oneway ANOVA and student t - test.

For scanning electron microscopic(SEM) examination of root surface changes following root planing, 15 root surfaces of remaining 9 teeth were root planed and 3 specimens were randomly selected.

The mean loss of tooth substance removed was Group 1, 7.0 ± 1.09 mg, Group 2, 1.3 ± 1.00 mg, Group 3, 5.8 ± 1.72 mg, Group 4, 8.7 ± 1.34 mg, and Group 5, 4.5 ± 1.68 mg following root planing, respectively. These results indicate that curette is effective instrument in the respect of diseased root substance removal.

The average surface roughness values are following results : Group 1 and Group 4 were the smoothest surface (Ra= 0.34 ± 0.06 μm, Ra= 0.34 ± 0.04 μm, respectively) and Group 2 was the roughest surface (Ra= 2.09 ± 0.06 μm). Statistical analysis of roughness values demonstrated a highly significant difference (P<0.05) between each experimental groups. However, no statistically significant difference in roughness values were observed between the Group 1 and Group 4.

The results in this study suggest that curette and/or polishing procedure should be done after root planing with ultrasonic scaler and caution should be used with dia -

mond - coated bur during routine root plan -
ing procedure.