

# 35% Carbamide Peroxide gel의 적용시간에 따른 법랑질 변화

## 1. 서론

10% carbamide peroxide가 22% 35% car-  
bamide peroxide<sup>2)</sup>.  
가  
10% 15% carbamide peroxide 2  
15%  
3) 10% 20% carbamide peroxide  
2 20%  
carbamide peroxide  
가 가 가 carbamide peroxide  
4). Lenarde 5)  
30 35% hydrogen peroxide  
35% carbamide peroxide  
가  
가 carbamide peroxide 가  
가  
Heywood Heymann<sup>1)</sup> 10% carbamide peroxide 15% carbamide  
peroxide  
가 35% carbamide peroxide

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가 6-  
<sup>10)</sup>. Carbamide peroxide hydrogen peroxide urea , 10% carbamide peroxide 3.62% hydrogen peroxide , 22% carbamide peroxide 7.92% hydrogen peroxide . 35% carbamide peroxide 11.7% hydrogen peroxide 6% hydrogen peroxide 가<sup>7)</sup> carbamide peroxide 가<sup>8)</sup> carbamide peroxide 가

**2.1.1 시편제작**

0.1% (Sigma, U.S.A.) 1 x 1cm 가 24 (Automatic Polisher; Labopol-1, Struers, Denmark) 800, 1000, 1200, 1500 grit abrasive paper , 1µm 30

**2.2 연구방법**

**2.2.1 시편변색 및 전처리**

가 가 ( ; pH 2.26±0.02) 24 가 24 가 , 24 3 가 4 (Table 1). WHITE

**2. 연구재료 및 방법**

**2.1 연구재료**

smile 35% Carbamide Peroxide gel (WHITE smile GmbH. Inc. Germany) 1 7 1

표 1. The classification bleaching group according to bleaching time

Group	Classification	Application period
1	Control group	Distilled water(D.W.)
2	Experimental group	35% Carbamide Peroxide gel 1hour/day
3	"	35% Carbamide Peroxide gel 2hour/day
4	"	35% Carbamide Peroxide gel 3hour/day

2 , 3

7

bleaching gel

D.W(Distilled water) 가

1

, 3 , 7

### 22.4 치아 표면 무기질의 변화

(EDS, S-4300 & EDX-350, Hitachi,

Japan)

3

20kV 가

1 $\mu$ m

### 22.2 법랑질 표면의 미세경도 측정

Vickers diamond indenter가

(MVK-H100, Hardness Testing

Machine, Akashi Corporation, Japan)

vickers hardness number(VHN)

200gm

10

400

200 $\mu$ m

1 , 3 , 7

### 22.5 자료분석

SPSS

13.0 package program

paired t-test

Duncan

300 400 VHN

3

### 22.3 법랑질 표면의 미세구조 분석

(Field emis-

sion scanning electron microscope, Hitachi,

Japan)

3

1

2

(Ion sputter, Hitachi,

Japan)

70nm

20kV

(VHN)

7

1

( $p>0.05$ ).

2 , 3

가

3

( $p<0.05$ )<Table 2>.

## 3. 연구성적

### 3.1 35% Carbamide Peroxide gel의 노출시간에 따른 법랑질의 미세경도 변화

표 2. VHN values of enamel during the process

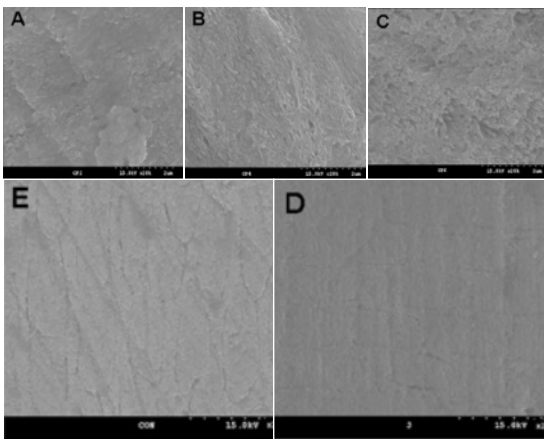
Group	N	Baseline (24hours staining.)			Treatment days			p-value
					1 day	3days	7days	
D.W	6	233.17 ±3.24	<sup>a</sup>	231.12 ±4.35 <sup>a</sup>	228.32 ±8.59 <sup>a</sup>	228.44 ±5.21 <sup>a</sup>	p>0.05	
CP 1 hours	6	236.12.±6.21	<sup>a</sup>	235.11 ±5.24 <sup>a</sup>	228.33 ±7.96 <sup>a</sup>	226.58 ±9.21 <sup>a</sup>	p>0.05	
CP 2 hours	6	233.78 ±3.69	<sup>a</sup>	231.78 ±3.69 <sup>a</sup>	221.58 ±4.59 <sup>b</sup>	212.59 ±10.58 <sup>c</sup>	p<0.05	
CP 3 hours	6	235.74 ±4.12	<sup>a</sup>	229.74 ±4.12 <sup>a</sup>	210.29 ±12.39 <sup>c</sup>	191.44 ±14.55 <sup>d</sup>	p<0.05	

Values are reported as the Mean ± Standard deviation

<sup>a,b,c,d</sup> The same letter indicates no significant difference at = 0.05 by Duncan's studentized range test  
Statistical comparison by ANOVA test

### 3.2 35% Carbamide Peroxide gel의 노출시간에 따른 법랑질 표면의 미세 구조 변화

Hitachi, Japan)



<Figure 1>.

Figure 1. SEM images of enamel surfaces. A: 35% Carbamide Peroxide gel 1 hour for 7days, B: 35% Carbamide Peroxide gel 2 hours for 7days, C: 35% Carbamide Peroxide gel 3 hours for 7days, D: Sound tooth (baseline), E: Enamel with cola staining (baseline)

(Field emission scanning electron microscope,

### 3.3 35% Carbamide Peroxide gel의 노출시간에 따른 법랑질 표면의 무기 질 변화

표 3. Contents of calcium and phosphate in enamel surface for 7 days

Group	N	Baseline (24hours staining)			7 days				
		Ca	P		Ca	P			
D.W	6	33.46±1.25	<sup>a</sup>	17.54±0.25	<sup>b</sup>	32.56±1.22	<sup>a</sup>	17.12±0.46	<sup>b</sup>
CP 1 hours	6	34.18±2.58	<sup>a</sup>	18.09±1.02	<sup>b</sup>	32.05±1.46	<sup>a</sup>	18.02±0.57	<sup>b</sup>
CP 2 hours	6	31.45±3.97	<sup>a</sup>	18.24±0.55	<sup>b</sup>	30.86±1.25	<sup>a</sup>	17.46±1.33	<sup>b</sup>
CP 3 hours	6	34.05±2.56	<sup>a</sup>	17.58±0.48	<sup>b</sup>	27.27±1.99	<sup>a</sup>	14.39±0.28	<sup>b</sup>

Values are reported as the Mean ± Standard deviation

<sup>a,b</sup> The same letter indicates no significant difference at = 0.05 by Duncan's studentized range test

Ca, P

3

<sup>12)</sup>

가

35% Carbamide Peroxide

(P>0.05)<Table 3>.

1

#### 4. 중괄 및 고안

가

가

가

1

2

3

Ol tu Gurgan<sup>6)</sup> 10%, 16% Carbamide Peroxide

가

35% Carbamide

Peroxide

<sup>6-10)</sup>

가

35%

가

Carbamide Peroxide

1

(SEM)

11).

가

Ben - Awar <sup>13)</sup>, McGuckin

<sup>14)</sup> Nathoo <sup>15)</sup>

Ca, P

<sup>16)</sup>

3.

Ca, P

35% Carbamide

Peroxide gel

(P>0.05).

35% carbamide

가

peroxide(CP)

가

in vitro

가

가

in vivo, in situ

가

### 참고문헌

가

### 5. 결론

가

35% Carbamide Peroxide

가

1.

7

가

2

(P<0.05).

2.

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**Abstract**

## Surface change of enamel according to application time of 35% Carbamide Peroxide

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Key words: Enamel surface, 35% Carbamide Peroxide, Microhardness

The purposes of this study were to examine the effect of 35% Carbamide Peroxide(CP) bleaching agent on the changes in physical and chemical characteristics of tooth. The effect of bleaching agent on enamel was analyzed using Hardness test, SEM and EDS. The microhardness between bleached groups after bleaching showed statistically significant difference according to the paired t-test. The bleached enamel surface showed apparent morphological changes compared to the enamel, which was stored in distilled water only. The difference of the total mineral contents for the distilled water and Carbamide Peroxide did not show statistical significance.

These results demonstrated that bleaching using 35% Carbamide Peroxide were adversely affects application time of experimental group and may confirm the safety of using these agents for a short time in dentist-monitored bleaching.

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