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SEM evaluation of erosion depth and etching pattern of enamel of 18% HCL and 15% HCL

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Background

- In early caries lesions, the enamel surface remains relatively unaltered, whereas the mineral loss in the underlying lesion body can be substantial. ('white spots').
- In clinical practice, the usual therapeutic strategy for such lesions is to promote remineralization
- An alternative approach could be the infiltration of the caries lesions with low-viscosity light curing resins.



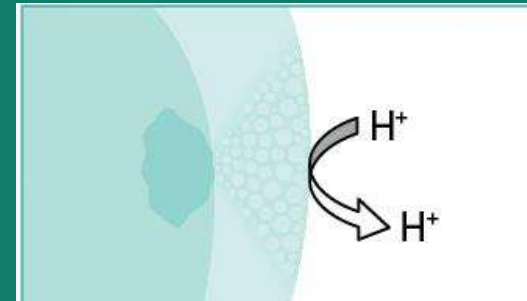
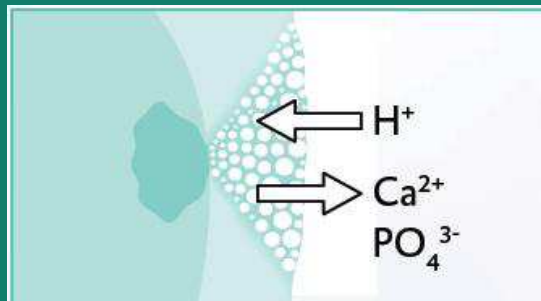
Resin Infiltration Technique

- Resin Infiltration Technique (RIT) has been suggested to prevent the progression of incipient caries and sealing the demineralized tooth structure in interproximal and labial surfaces.
- This treatment aims to occlude pores within the lesion body which act as diffusion pathways for acids and dissolved minerals .so the caries progression is slowed down or even arrested.



Resin Infiltration Technique

- In this technique, 15% HCL is applied for 120 seconds to erode the enamel surface followed by application of a special resin to seal the demineralized parts.
- Since the infiltration of enamel caries with light curing resins is mainly driven by capillary forces, the pore diameter and volume influence the penetration speed, therefore, the surface layer forms a barrier, which might hamper the infiltration of the lesion body. as a result, removing or perforating the surface layer might be essential for a successful infiltration of the lesion body.



Aim

The aim of this study was evaluating the effect of 18% HCL, made in Iran on etching pattern of enamel and compare it with 15% HCL by SEM in different times.

Life in the Medical School

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First Year... 😊

Final Year...!! 😞

*Materials &
Methods*

Extracted human anterior teeth were selected to provide sound enamel surface



Each tooth was divided into two equal parts in incisogingival plan & they were randomly divided into following groups



15 % HCL (Icon,DMG,Germany)

Group 1 :
(n=8)
75 Sec

Group 2 :
(n=8)
90 Sec

Group 3 :
(n=8)
120 Sec *

18 % HCL (Kimia, Iran)

Group 4 :
(n=8)
75 Sec

Group 5 :
(n=8)
90 Sec

Group 6 :
(n=8)
120 Sec

* (Recommended by Manufacturer)

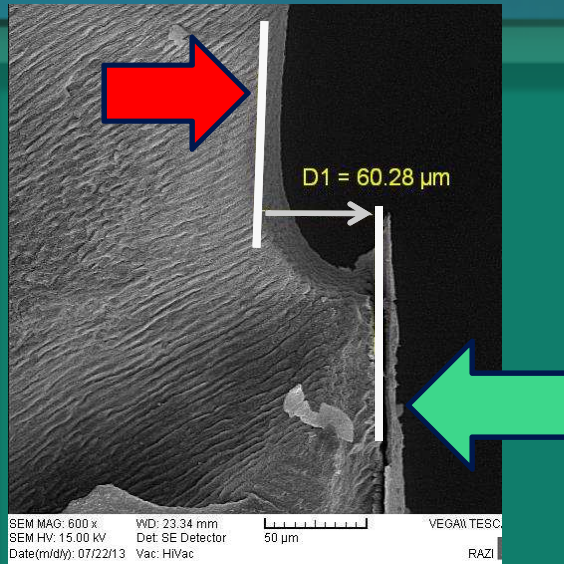
SEM Evaluation



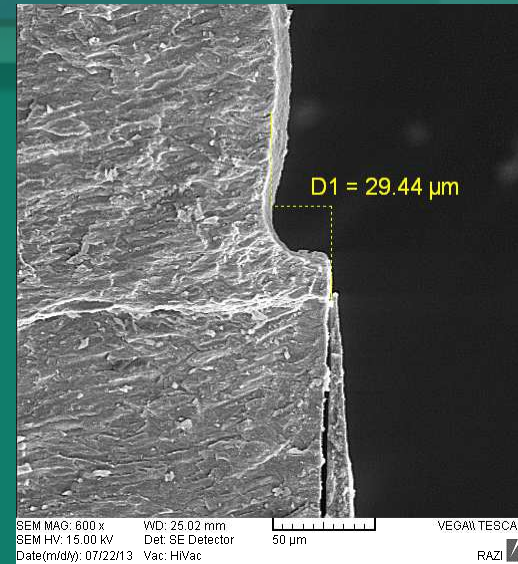
SEM



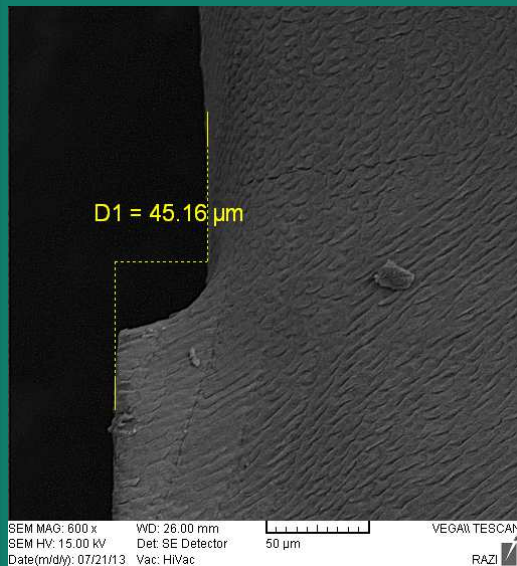
SEM (Erosion Depth)



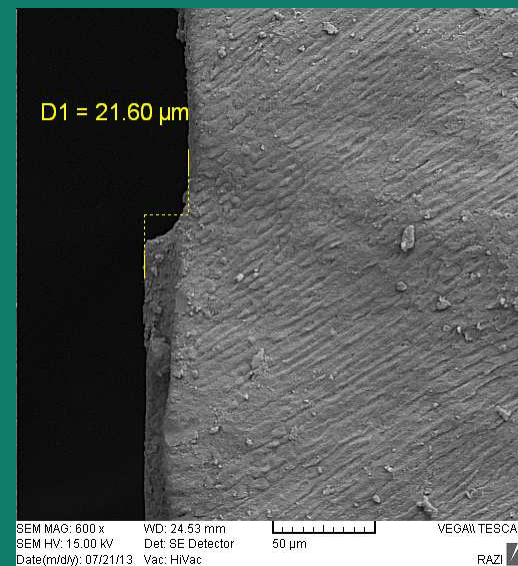
18 % HCL / 120 S



15 % HCL / 120 S



18 % HCL / 90 S



15 % HCL / 90 S



Results

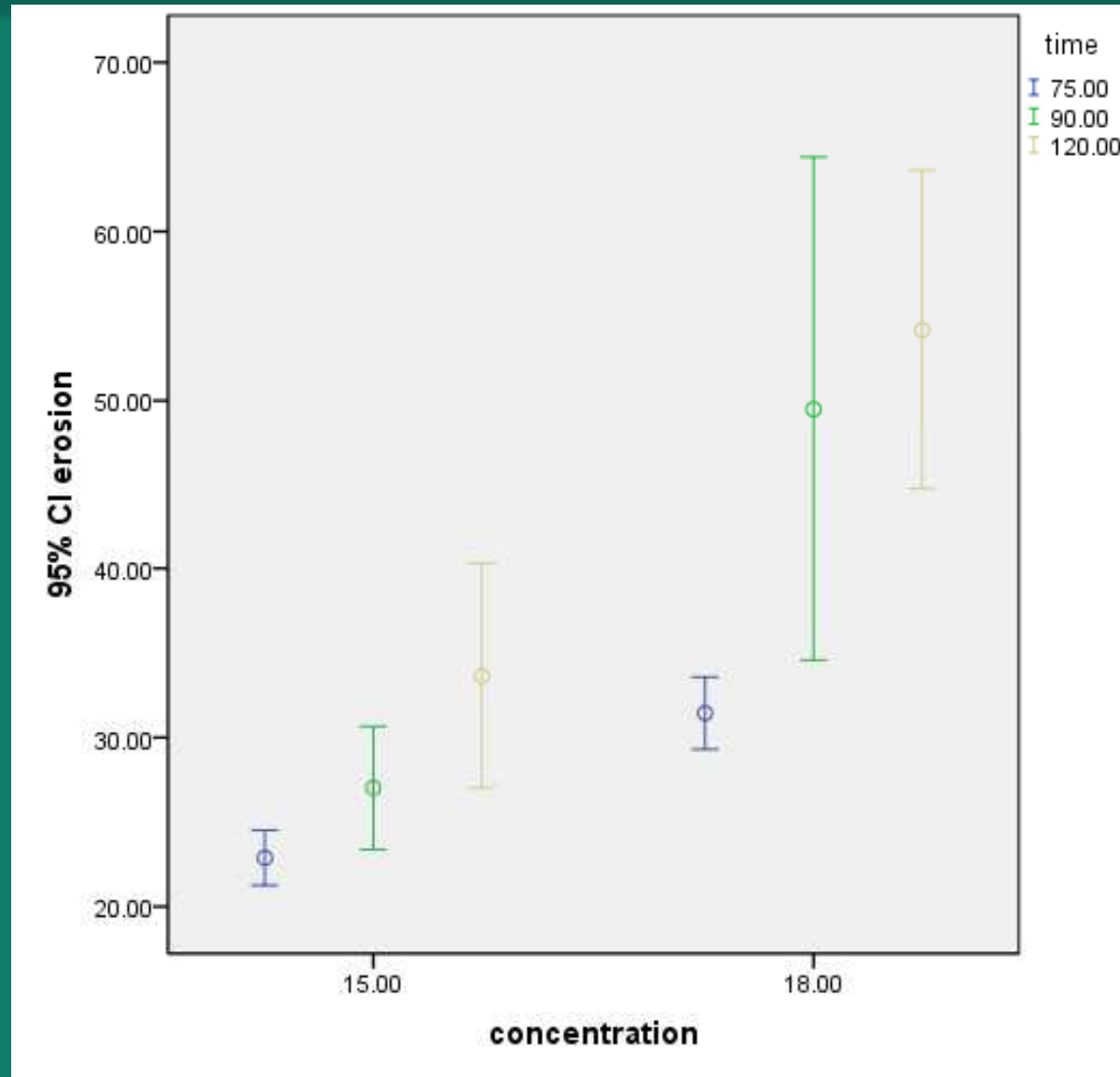
Table 1 : Mean(SD) of erosion depth in all groups (μm)

Statistical analysis: ANOVA / TUKEY HSD

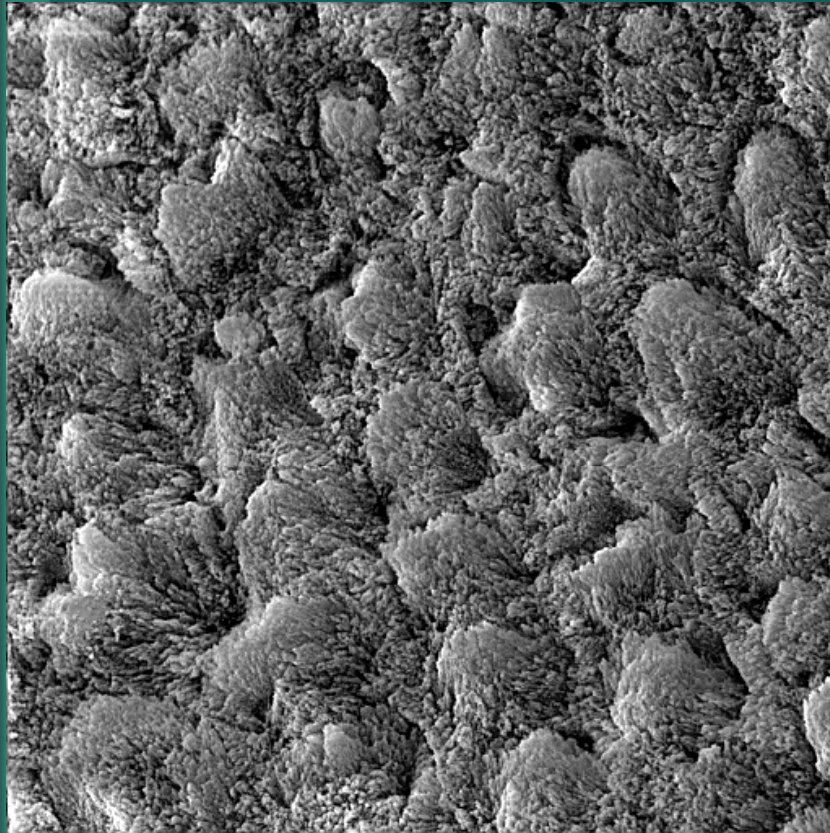
Group	N	Depth of Erosion (μm)
G1: 15% HCL,75s	8	22.89(1.95)
G2: 15% HCL,90s	8	27.01(4.35)
G3: 15% HCL,120s	8	33.65(7.94)
G4: 18% HCL ,75s	8	31.44(2.56)
G5: 18% HCL ,90s	8	49.49(17.84)
G6: 18% HCL,120s	8	54.17(11.31)

- The mean demineralization depth was increased by increasing the time of application of both HCLs (18% & 15%).
- The depth of erosion in all 18% HCL groups was more than 15% HCL groups in the same application time. ($P < 0.05$).
- In groups G3 and G4 : There was not a significant difference in the mean of demineralization depth ($P > 0.05$).

Mean(SD) of erosion depth in all groups (μm)



Etching Pattern

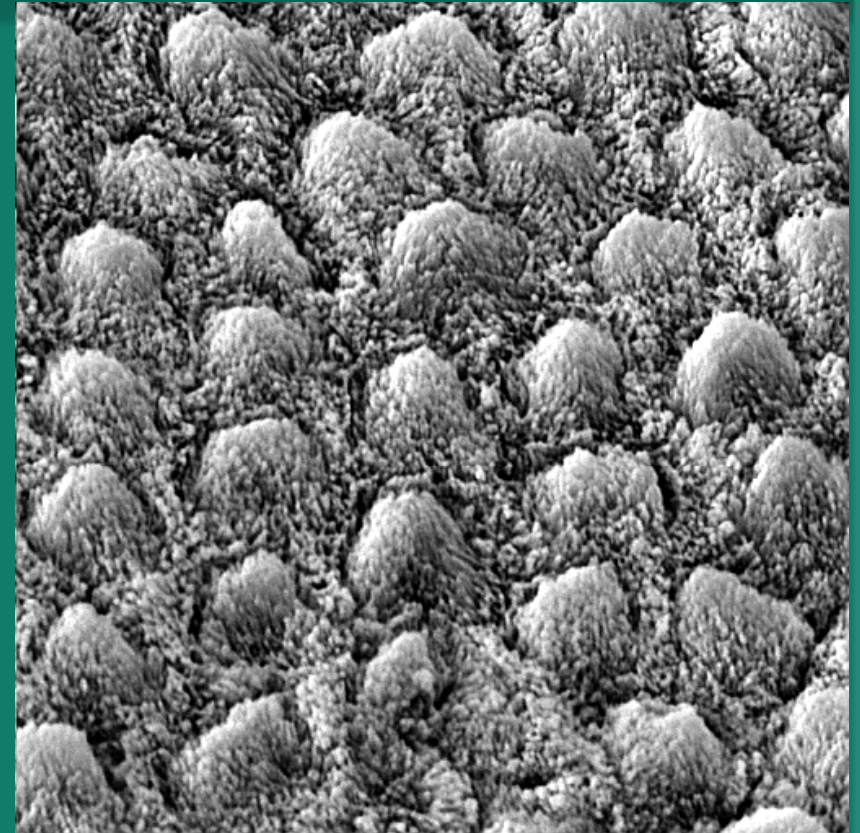


SEM MAG: 5.00 kx WD: 14.37 mm
SEM HV: 15.00 kV Det: SE Detector
Date(m/d/y): 07/21/13 Vac: HiVac

5 μm

VEGA\\ TESCAN
RAZI

15% HCL / 90 S



SEM MAG: 5.00 kx WD: 24.21 mm
SEM HV: 15.00 kV Det: SE Detector
Date(m/d/y): 05/27/13 Vac: HiVac

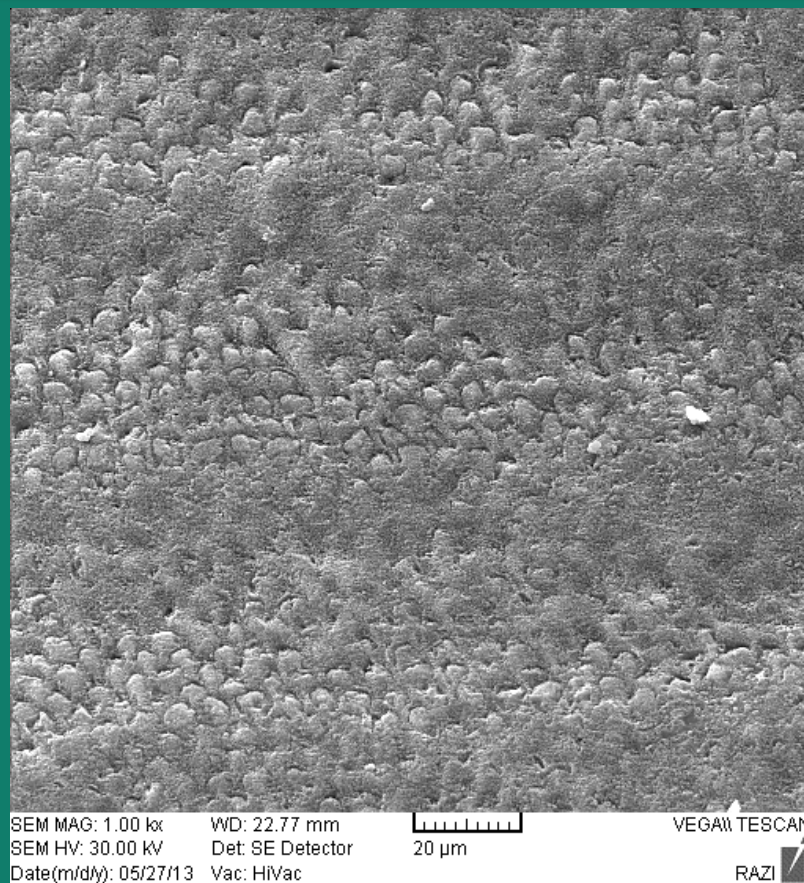
5 μm

VEGA\\ TESCAN
RAZI

18% HCL / 90 S

Etching Pattern

Application of 18% HCL for 60 seconds resulted in partial etching pattern on enamel. No homogenous pattern in the surface erosion was observed.



18% HCL , 60s

Discussion & Conclusion

- In contrast to fissure sealing, where the diffusion barrier is placed on top of the lesion, the infiltration technique aims to create a diffusion barrier inside the lesion and replacing lost mineral with resin.
- HCL in similar concentration as used in the present study is widely accepted in aesthetic dentistry.

- This research was done to determine that what time of application of 18% HCL acts the same as 15% HCL in 120 seconds.
- Because of the high cost of this product , it is not economic to use it as a treatment for post orthodontic decalcification (POD), therefore, we decided to substitute the available HCL in Iran's market for it .

- The results of this experimental study revealed that application of 18% HCL for 75 seconds acts the same as 15% HCL for 120 seconds.

- There is need to carry out another study to substitute the available resins in Iran's market for Icon Infiltrant that has been done by my colleague.

Thank you very much for your kind attention

