

# Evaluation of The capacity of Fluoride Uptake by Enamel from Bio-active Restorative Materials in Primary Molars (In Vitro Study)

Sarah Ahmed Shawky <sup>1\*</sup> BDS, Amina M. Abd El Rahman <sup>2</sup> PhD, Sarah Ibrahim Mohamed Zeitoun <sup>3</sup> PhD

1. Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Alexandria University, Egypt

2. Professor of Pediatric Dentistry, Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Alexandria University, Egypt

3. Lecturer of Pediatric Dentistry, Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Alexandria University, Egypt

\*Corresponding author

## INTRODUCTION

Cention-N, TMR-Z Fill 10 universal, and Fuji II LC, are fluoride-containing bio-active restorative materials that can promote fluoride release and recharge capacity after treatment with topical fluoride. <sup>(1)</sup>

## METHODOLOGY

27 freshly extracted sound primary molars were collected, class V cavities were prepared. Teeth were randomly allocated into three groups: Group I: (n= 9) restored with Cention N, Group II: (n= 9) restored with TMR-Z Fill 10 universal, Group III (n=9) restored with Fuji II LC. Fluoride concentration in enamel (uptake) was evaluated for all teeth before, and 21 days after restoration using acid-etch enamel biopsy. The buccal surface of each tooth was subjected to an acid etch enamel biopsy using perchloric acid for 60 seconds, taken from a standardized circular window of 2mm in diameter punched in an adhesive tape (Figure 1). <sup>(2)</sup>

The fluoride concentration in the solutions containing the enamel biopsies was determined using the fluoride ion specific electrode in conjunction with a reference electrode. <sup>(3)</sup>

Comparison between groups was done using Kruskal Wallis test followed by Dunn's post hoc test with Bonferroni adjustment. Wilcoxon Signed-rank was performed to assess differences in fluoride uptake at baseline and after 21 days within each group. Significance level was set at p value 0.05.

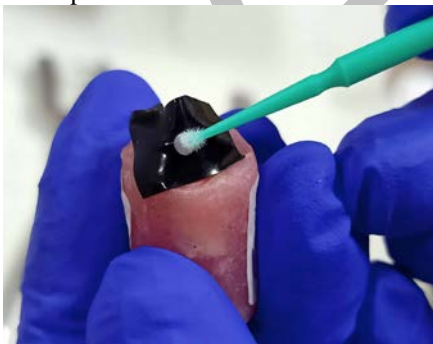


Figure (1): Acid Etch Enamel Biopsy

## RESULTS AND DISCUSSION

By comparing the median fluoride ion concentration in the enamel within each group, it showed a statistically significant increase in fluoride concentration after restoration in the three groups (Table 1).

After a 21-days interval, there was a statistically significant difference between the three groups in median fluoride uptake by enamel ( $P$  value= 0.001\*).

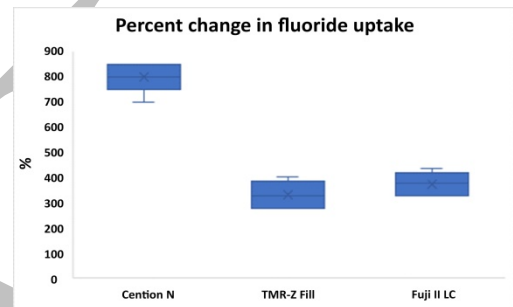


Figure (2): Box and plot graph of percent change in fluoride uptake by enamel (1<sup>st</sup> enamel biopsy and 2<sup>nd</sup> enamel biopsy) for the three studied groups.

The highest median percent change in fluoride concentration in enamel (uptake), was in Cention N group (800%), followed by Fuji II LC group (375%) and TMR-Z Fill group (325%) respectively, after a 21-days interval, with a statistically significant difference between them ( $P$  value <0.0001\*) (Figure 2).

This may be attributed to the significant fluoride release from the three materials. The pattern of fluoride uptake is in accordance with the fluoride release process of a material. <sup>(4)</sup>

Table (1): Comparison of fluoride uptake by enamel among the three study groups.

		Cention N	TMR-Z Fill	Fuji II	P value
Baseline	Median	0.020	0.040	0.040	<0.0001*
	Min – Max	0.020 – 0.020	0.030 – 0.040	0.030 – 0.040	
Day 21	Median	0.180	0.150	0.170	0.001*
	Min – Max	0.160 – 0.190	0.140 – 0.170	0.150 – 0.190	
P value		0.007*	0.006*	0.007*	

## CONCLUSION

Enamel acquired significantly higher amount of fluoride (uptake) from Cention N compared to Fuji II LC, and TMR-Z Fill respectively after a 21-days interval. All the three materials could be considered suitable for class V restorations of primary teeth in high caries risk children.

## REFERENCES

- Gupta N, Jaiswal S, Nikhil V, Gupta S, Jha P, Bansal P. Comparison of fluoride ion release and alkalizing potential of a new bulk-fill alkasite. J Conserv Dent. 2019;22(3):296-99.
- Scoville RK, Foreman F, Burgess JO. In vitro fluoride uptake by enamel adjacent to a glass ionomer luting cement. ASDC J DentChild. 1990;57(5):352-5.
- El-Hefnawy A. Evaluation of glass ionomer as a pit and fissure sealant on permanent posterior teeth: in vitro study [Master's thesis]. Alexandria University ; 2015.
- El-shweekh, R. A., evaluation of fluoride release and uptake ability in giomer and compomer restorations in primary teeth: in vitro study [Master's thesis]. Alexandria University ; 2019.