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Research Report

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Fluoride Ion Release from Several Fluoride Varnishes

Purpose: The purpose was to evaluate the release of fluoride ion into water as a function of time for several fluoride varnishes.

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Materials and Methods:

Five fluoride varnishes were evaluated: ***Embrace Varnish*** *(Pulpdent Corp)*, ***Enamel-Pro*** *(Premier Dental Products Co.)*, ***PreviDent Varnish*** *(Colgate)*, ***3M ESPE Vanish 5% Sodium Fluoride White Varnish*** *(3M ESPE)* and ***VELLA Varnish*** *(Preventech)*. The fluoride electrode was calibrated using several known concentrations of fluoride ion to produce a graph of EmV vs log of concentration in ppm. Plastic specimens (n=1) of approximately the same size (1.5 x 1.5 mm) were weighed and then evenly painted with fluoride varnish so that the end weight was approximately 50 ± 1.0 mg. The specimens were allowed to dry for about five minutes and then re-weighed to determine the exact weight of the varnish that had coated the surface of the specimen. Each painted specimen was then placed into a capped glass container along with 10 mL of distilled water. After each of six different time periods (15 minutes, 30 minutes, 1, 2, 3, and 4 hours), the water was decanted into a separate clean container. The container with the specimen was immediately replenished with fresh distilled water. Three mg of the decanted water was weighed out and an equal amount of TISAB II buffer added to it. The fluoride electrode was then placed into the buffered fluoride solution, allowed to stabilize for approximately five minutes and then the milli-volt reading (EmV) from the Ion meter was recorded. The calibration graph was then used to convert the EmV reading into a corresponding value of fluoride ion release (ppm) at each time point.

Results:

Figures 1 and 2 present the cumulative fluoride ion release (mg and cumulative percent) for the five fluoride varnishes tested.

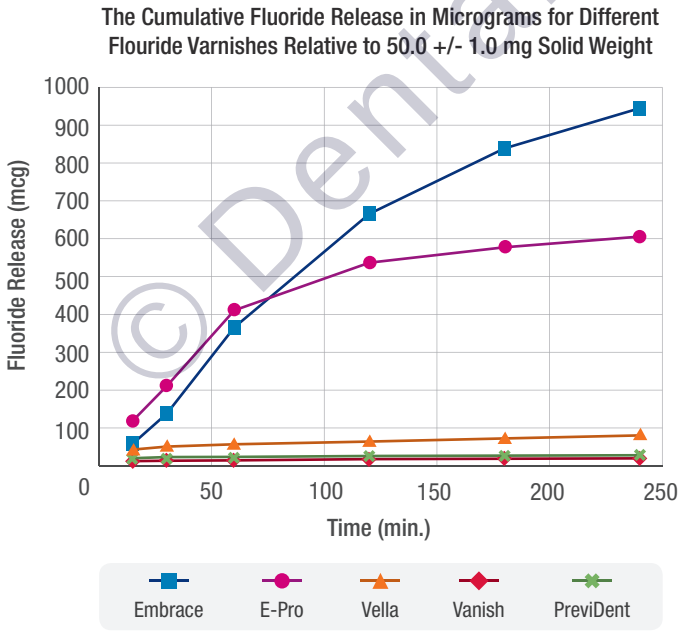

FIGURE 1: Cumulative fluoride ion release in mg relative to 50.0 mg specimen.

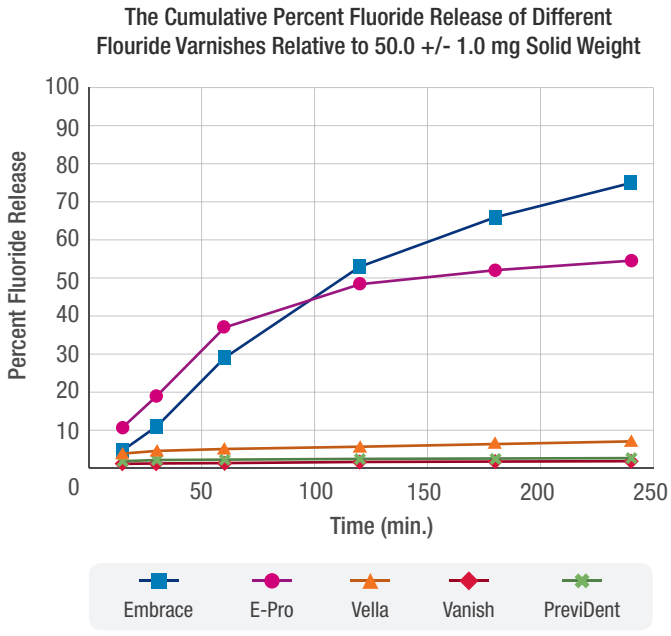

FIGURE 2: Cumulative percent fluoride ion release in mg relative to 50.0 mg specimen.

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Discussion:

Embrace Varnish was the only varnish tested that did not separate while on the shelf and did not have to be mixed. The other four varnishes were observed to have separated into at least two different density materials while in the package. For these four products, instructions state that mixing is absolutely required using the packaged brush. It should be noted, however, that mixing with the supplied brush may result in the bristles conducting the first component of the separated product it touches deep into the central bristles where it may not be subsequently mixed into the whole of the product. For this reason, a first brush was used to mix the "separated" components and a second brush was used to dip into the mixture and paint the specimen. In clinical use, it seems possible a partially mixed, non-homogeneous product could be delivered to the tooth when the single brush technique is used with these four "separated" products. It is also possible that mixing with a brush could produce a mixture with sub-optimal properties, but this factor was not studied. It is suggested that for those fluoride varnishes that separate, mixing should be performed with a small spatula and then delivered to the tooth with the supplied brush.

Conclusions:

The amount and rate of fluoride ion release were significantly greater for ***Embrace Varnish*** and ***Enamel-Pro*** than for ***PreviDent Varnish***, ***3M ESPE Vanish 5% Sodium Fluoride White Varnish***, and ***VELLA Varnish***. The rate of release of fluoride ion over the four-hour period of the study was relatively constant for ***Embrace Varnish*** (producing an ever increasing amount of fluoride ion during the length of the study) when compared with ***Enamel-Pro***, which exhibited a diminishing rate of release after one hour, when it transitioned to a low release rate similar to ***VELLA Varnish***, ***Vanish***, and ***PreviDent Varnish***.

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