

Fluoride Varnish Products in the U.S. Market

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The mechanism of fluoride ions [F⁻] to inhibit or even reverse the initiation and progression of dental decay, an infectious oral caries disease, is well documented [1,2]. Fluoride ions are available in different forms; fluoridated water, milk or salt for public dental prevention; and fluoride drops, tablets, rinses, foams, gels and varnishes for individual caries prevention. Fluoride varnishes, with the typical high concentration of 22,600 parts per million fluoride, were developed to prolong the contact time between fluoride and the tooth surfaces, thereby improving the uptake of fluoride by the tooth surfaces [3]. However, the more important mechanism of action of these varnishes is the interaction with saliva to form calcium fluoride (CaF₂) compounds [3]. These calcium fluoride deposits act as a prolonged source of fluoride ions to be released slowly to the oral environment

[4]. Thus, fluoride works both for the inhibition of the demineralization i.e. preventing the loss of tooth minerals as well as remineralization to rebuild the lost tooth minerals.

Over 50 years, fluoride varnishes have been used for the professional topical fluoride applications in Europe [1,2]. The use of fluoride varnish for caries prevention was introduced in the United States in the 1990s [5] and their use have rapidly increased during the past few years. The primary reasons for the increasing popularity among the dental professionals in the U.S. are the evidence-based efficacy of fluoride varnishes on caries prevention [1,2,6,7], safety of this form of fluoride delivery [6], easy and fast application, and convenient application procedure for even dental auxiliary to use it [3]. Their effectiveness and safety are documented in more than 50 clinical trials [1,2].

Recently, we have seen more new fluoride varnish products to appear in the U.S. dental market. Duraphat® (Colgate Oral Pharmaceuticals) varnish is one of the fluoride varnishes and has been the most extensively studied, producing significant caries reductions in both primary and permanent dentition [2,6]. Several fluoride varnish products are currently available in the United States; Duraflor (Pharmascience Inc.), Cavity Shield (OMNII Preventive care, a 3M ESPE dental company), and Fluor Protector (Ivoclar Vivadent). Full list presented in the Table 1. All of these varnishes except Fluor Protector contain 5% sodium fluoride (22,600 parts per million fluoride ions [F]).

Based on the evaluation by Shen and Autio-Gold [8], Duraphat showed more uniformity and less separation of ingredients than Duraflor varnish. To reduce the possible separation and thus improve the uniformity of the varnish, it is recommended that the varnish be mixed by hand in the provided well. Several varnishes are now packaged as the individual dose units and mixing is recommended before clinical application. Some of these varnishes also appear as a light, yellowish-brown layer on the teeth surfaces after application. However, this temporary discoloration disappears after a day with regular tooth brushing [9]. For patients to avoid a light yellow temporary color, white color varnishes such as Vanish and Prevident are available.

Frequency of fluoride varnish applications should be based on an individual patient's risk to develop dental caries [1,2,5]. The semiannual application of varnish is commonly recommended, however, for patients with high risk for caries, four times a year or an intensive three applications of varnish in one week [10], can be an effective delivery mode [1,5].

Fluoride Name	Unit Dose	Fluoride	Manufacturer
All Solutions/ NUPRO	0.25 ml	5%NaF	Dentsply Professional
Butler® Fluoride Varnish	10 MI tubes	5% NaF	Butler
Cavity Shield™	0.25 ml	5%NaF	Omni/3MESPE
	0.40 ml		
Kolorz Clear Shield	0.40 ml	5%NaF + xylitol	DMG America LLC
Duraflor Duraflor HALO White Varnish	0.25 ml/0.40 ml	5%NaF 5%NaF + xylitol	Medicom
	10 ml tube		
	0.50 ml		
Duraphat® Varnish	10 ml tube	5%NaF	Colgate Oral Pharmaceuticals
DuraShield Fluoride Varnish	0.40 ml	5% NaF	Sultan Healthcare
EnamelPro® Varnish	0.25 ml	5%NaF + ACP	Premier DentalProducts
	0.40 ml		
Flor- OpalVarnishWhite	0.50 ml	5%NaF	Ultradent Products, Inc.
Fluor Protector	0.40 ml	0.1% difluorosilane	Ivoclar Vivadent, Inc
Fluoridex Lasting Defense™ 5% Neutral Sodium Fluoride Varnish		5% NaF	Discuss Dental
Fluoro Dose®	0.30 ml	5% NaF	Centrix
PreviDent®Varnish	0.40 ml	5%NaF	Colgate Oral Pharmaceuticals
Profluorid Varnish	0.25 ml	5% NAF + xylitol	VOCO America
	0.40 ml		
Topex Dura Shield	0.40 ml	5%NaF	Sultan Healthcare
Waterpik® Ultrathin Fluoride Varnish	0.40 ml	5% NaF	Waterpik
Vanish™ 5% Sodium Fluoride White Varnish	0.50 ml (canbeused As 0.25 ml and0.40 ml)	5%NaF + TCP	Omni/3MESPE
Varnish America™	0.25 ml	5%NaF	Medical Product Laboratories
	0.40 ml		
VELLA	0.50 ml	5%NaF+xylitol	Preventive Technologies
Zooby® Fluoride Varnish		5% NaF	Denticator Inc

Table 1: Fluoride Varnish Product List.

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Received August 16, 2013; Accepted August 17, 2013; Published August 22, 2013

Citation: Gold J (2013) Fluoride Varnish Products in the U.S. Market. J Res Development 1: e102. doi: 10.4172/2311-3278.1000e102

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The Centers for Disease Control and Prevention [11], and American Dental Association Council on Scientific Affairs [7] recommend the use of fluoride varnish for children and adults at moderate or high risk for caries as professionally applied topical fluoride, in addition to tooth brushing twice a day with fluoride toothpaste. Due to a recent rapid increase in several new fluoride varnish products in the U.S. market and the widespread use of fluoride varnish for caries prevention, more clinical research is needed to evaluate the consistency and uniformity and the clinical efficacy of these new products to prevent caries.

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