

Introduction:

In addition to whitening, tooth polishing is a property that consumers expect from a dentifrice. Although many dentifrices claim to polish (impart luster) the teeth, there has not been much quantifiable evidence to confirm these claims.

Objective:

To evaluate using a laboratory procedure the enamel polishing effectiveness of 26 dentifrices that are currently marketed for whitening and/or polishing capabilities and have an assortment of different compositions.

Methods:

- Bovine, permanent incisors, which were mounted in acrylic blocks, were leveled with a surface grinder to produce flat labial surfaces suitable for optical measurements.
- Enamel polish was measured before/after treatment by taking specular reflectance readings (60°) with a Rhopoint Novo-Curve™ Glossmeter.
- Before treatment, tooth specimens were etched in 0.5M HCl for 30 sec to provide dull baseline surfaces.
- Treatments were performed on a V-8 cross-brushing machine using dentifrice slurries (5:8 dentifrice/water ratio) and ADA nylon-bristle toothbrushes at 300 gm pressure for 2000 strokes.
- 26 commercial dentifrices, purchased through retail outlets or online, were tested with calcium pyrophosphate (1:5 with 0.5% CMC) as a reference standard.
- Results are reported as the percentage of a white carrara glass standard (mean of 8 replicates).
- Between-treatment comparisons were performed by ANOVA and SNK test.

Results:

The glossmeter measured the intensity of specular light reflected by the tooth specimens. The greater the intensity of light reflected, the higher was the luster of the tooth and hence the higher the numerical polish score. The polish score for the acid-dulled teeth was less than 5.

Brushing with all dentifrices significantly increased reflectance readings of the acid-dulled teeth, but mean polish scores ranged widely among the products. The most effective dentifrice contained refined kaolin clay and provided a polish score of 97, which was significantly better than the reference standard (score = 67) and all other dentifrices, which had scores ranging from 38 to 86. The majority of products contained hydrated silica abrasive systems, but their polish scores varied extensively from 38 to 80. Products containing other abrasives, e.g. dicalcium phosphate, sodium bicarbonate, and calcium carbonate, provided polish scores that fell within the range of hydrated silica-containing products, although one dentifrice containing fuller's earth was slightly better (score = 86).

Dentifrice Information

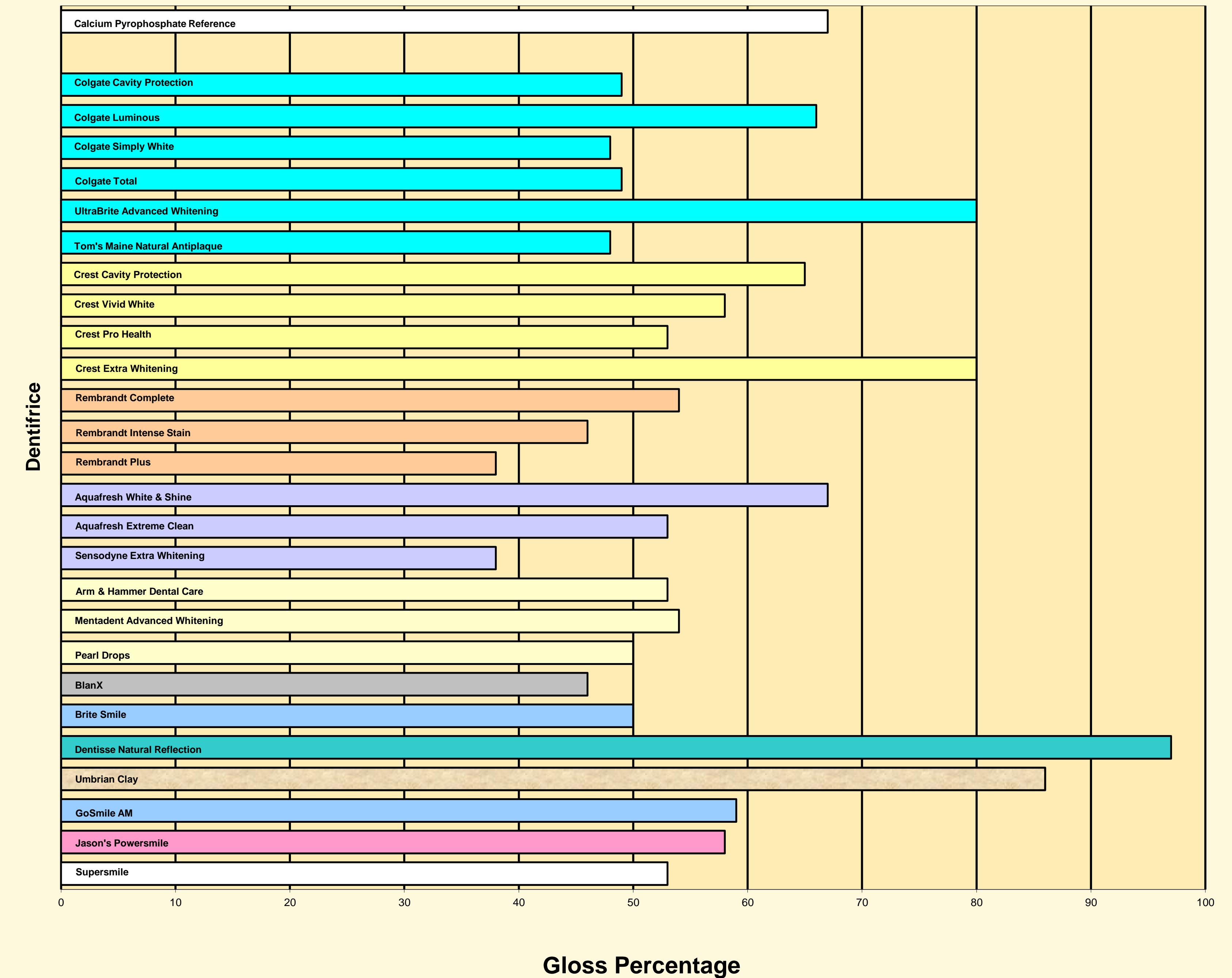
Gp	Dentifrice	Manufacturer	Abrasive	Other Relevant Ingredients
1	Colgate Cavity Protection	Colgate - Palmolive	Dicalcium phosphate	Tetrasodium pyrophosphate
2	Colgate Luminous	Colgate - Palmolive	Hydrated silica	Tetrasodium pyrophosphate, TiO ₂
3	Colgate Simply White	Colgate - Palmolive	Hydrated silica	TiO ₂ , H ₂ O ₂
4	Colgate Total	Colgate - Palmolive	Hydrated silica	TiO ₂
5	UltraBrite Advanced Whitening	Colgate - Palmolive	Hydrated silica, Alumina	Tetrasodium pyrophosphate, TiO ₂
6	Tom's of Maine Natural antiplaque plus whitening gel	Tom's of Maine	Hydrated silica	
7	Crest Cavity Protection	Proctor & Gamble	Hydrated silica	
8	Crest Vivid White	Proctor & Gamble	Hydrated silica	Sodium hexametaphosphate, TiO ₂
9	Crest Pro Health	Proctor & Gamble	Hydrated silica	Sodium hexametaphosphate, Trisodium phosphate, TiO ₂
10	Crest Extra Whitening	Proctor & Gamble	Hydrated silica, Sodium bicarbonate	Tetrasodium pyrophosphate, Sodium carbonate, TiO ₂
11	Rembrandt Complete	Johnson & Johnson	Dicalcium phosphate	
12	Rembrandt Intense Stain	Johnson & Johnson	Hydrated silica, Dicalcium phosphate	
13	Rembrandt Plus	Johnson & Johnson	Hydrated silica	
14	Aquafresh White & Shine	GlaxoSmithKline	Hydrated silica	Disodium phosphate, TiO ₂
15	Aquafresh Extreme Clean	GlaxoSmithKline	Hydrated silica	TiO ₂
16	Sensodyne Extra Whitening	GlaxoSmithKline	Hydrated silica	TiO ₂
17	Arm & Hammer Dental Care	Church & Dwight	Sodium bicarbonate	
18	Mentadent Advanced Whitening	Church & Dwight	Hydrated silica, Sodium bicarbonate	H ₂ O ₂ , TiO ₂
19	Pearl Drops	Church & Dwight	Sodium bicarbonate, Hydrated silica	Tetrasodium pyrophosphate, TiO ₂
20	BlanX	Guaber, UK	Silica	TiO ₂
21	Brite Smile	BriteSmile, Inc	Hydrated silica	Pentasodium triphosphate, TiO ₂
22	Dentisse Natural Reflection	Dentisse, Inc	Refined Kaolin clay	Bentonite clay
23	Umbrian Clay	Fresh, Inc	Fullers earth	Sodium chloride
24	GoSmile AM	GoSmile, Inc	Hydrated silica	TiO ₂
25	Jason's Powersmile	Jason Natural Products	Calcium carbonate, Silica, Sodium bicarbonate	
26	Supersmile	Robell Research, Inc	Dicalcium phosphate, Sodium bicarbonate, Calcium carbonate	TiO ₂ , Ca H ₂ O ₂

Discussion:

The difference in luster imparted by the various products was visibly evident. An experienced observer can distinguish between teeth with mean polish scores differing by about 5 units. Thus, the teeth polished by the dentifrices in this study can be visually ranked from low to high polish.

Silicas, which are the most widely used dentifrice abrasives in the U.S., are available in a variety of grades that differ in manufacturing method and in particle size. These differences result in a range of physical properties that may account for the large differences observed in polishing ability. The most effective polishing was observed with dentifrices containing clay minerals, namely kaolin and fuller's earth.

Enamel Polish



Conclusions:

The enamel polishing capabilities of the dentifrices, especially those containing silicas, were highly variable, and did not correspond directly with abrasive systems as listed on the labels. With the exception of a product containing refined kaolin clay, dentifrices marketed for their ability to impart luster or sheen to teeth were no more effective than other products.