DENTIFRICES

A dentifrice is usually used in combination with toothbrushing with the purpose of facilitating plaque removal and applying preventive and therapeutic agents to the tooth surfaces.

A toothpaste is defined as a semi-aqueous material for removing naturally occurring deposits from teeth and is supposed to be used simultaneous with a toothbrush. The primary purpose of brushing the teeth with a dentifrice (dens — tooth, fricare — to rub) is to clean the accessible tooth surfaces of dental plaque, stains and food debris. Tooth cleaning with dentifrices dates back over 2000 years, while cleaning with toothpicks and brushes is an even older practice. Abrasive dentifrice materials came to be used when it was found that brushes, while facilitating the cleaning of soft deposits from teeth, were inadequate for the removal of harder deposits and stains. Dentifrices have been prepared in several forms such as powders, pastes and gels. The most popular forms are the pastes and gels. It is a substance used in conjunction with a toothbrush or interdental cleaner to facilitate bacterial plaque biofilm removal, or as a vehicle for transporting therapeutic or cosmetic agents to the tooth and its environment.

The dentifrice can either be:

Hygienic (cosmetic) which cleans and removes material alba, plaque biofilm, food debris and stains from tooth surfaces and polishes.

Therapeutic which transports the drug substance to the tooth surface or the oral tissue. It is suppose to reduce some disease process in the mouth. Therapeutic effect is to reduce caries incidence, gingivitis, calculus formation, or tooth sensitivity.

Exact composition of a particular dentifrice varies with each manufacturer but most toothpaste contains several or all ingredients shown in table.

Ingredients	*Percent*
Abrasive	40-50
Humectant	20-30
Water	20-30
Binding agent	1-2
Foaming agent (Detergent)	1-3
Flavoring agent	1-2

Preservative	0.05-0.5
Therapeutic agent	0.5-2
Sweetening agent	—

CLEANING AND POLISHING AGENTS (ABRASIVES)

A. Purposes

- Cleans well with no damage to tooth surface.
- A polishing agent is used to produce a smooth tooth surface.
- A smooth surface can prevent or delay the re-accumulation of stains and deposits.

B. Abrasives Used

- Calcium carbonate
- Phosphate salts
- Hydrated aluminum oxide
- Silica, silicates, and dehydrated silica gels

BINDERS (THICKENERS)

A. Purpose

- Stabilize the formulation
- Prevent separation of the solid and liquid ingredients during storage

B. Types Used

- Mineral colloids
- Natural gums
- Seaweed colloids
- Synthetic celluloses

HUMECTANTS (MOISTURE STABILIZERS)

A. Purposes

- Retain moisture
- Prevent hardening on exposure to air

B. Substances Used

- Xylitol
- Glycerol
- Sorbitol

PRESERVATIVES

A. Purposes

- Prevent bacterial growth
- Prolong shelf life

B. Substances Used

- Alcohol
- Benzoates
- Dichlorinated phenols

DETERGENTS (FOAMING AGENTS OR SURFACTANTS)

A. Purposes

- Lower surface tension
- Penetrate and loosen surface deposits
- Suspend debris for easy removal by toothbrush
- Emulsify/disperse the flavor oils
- Contribute to foaming action

B. Substances Used

- Sodium lauryl sulfate USP
- Sodium N -lauryl sarcosinate

THERAPEUTIC DENTIFRICES

A therapeutic dentifrice is one that contains a drug substance that has been incorporated into the formulation in an effort to produce a beneficial effect upon the oral tissues.

The beneficial effect may include:

• Reduction and prevention of dental caries.

• Prevention and reversal of gingival diseases.
• To reduce hypersensitivity.

Various therapeutic products tried in the past include chlorophyll and antibiotics such as penicillin. Penicillin dentifrices were used experimentally but were not accepted and major deterrent for their routine use possible allergic sensitization, development of resistant strains of microorganism and over growth of unwanted microorganisms.

ANTICARIES

Fluorides

Fluoride containing dentifrices provides protection against dental caries. Commercially available dentifrices contain sodium fluoride [NaF] 0.22%, stannous fluoride [SnF2] 0.4% or sodium monofluorophosphate [MFP] 0.76% and aminofluoride (AmF) 0.125%. All dentifrices currently marketed in the world are formulated to contain from 500 to 1500 ppm F. Aminofluorides are the most commonly used in toothpastes. Aminofluoride is recognized as the most effective in preventing tooth decay. It forms a protective film on the surface of the teeth, from which fluoride enters the enamel and makes it stronger.

Calcium/Phosphate

Calcium and phosphate supplementation in a dentifrice will increase the concentration of these ions in the oral cavity. This has been reported to improve remineralization and increase fluoride uptake. One of the latest effective developments in the prevention of caries development and enamel remineralization - Amorphous calcium phosphate (Recaldent).

ANTIGINGIVITIS AND ORAL BIOFILM REDUCTION AGENTS:

- Triclosan with 2% copolymer PVM/MA
- Chlorhexidine 0.12%
- Essential oils (combination):
- - Eucalyptol 0.738%
- - Menthol 0.340%
- - Methyl salicylate 0.480%
- - Thymol 0.511%
- - Cetylpyridinium chloride (CPC) 0.05%
- Antibacterial enzymes:

DESENSITIZING AGENTS

- Potassium salts (2% minimum to be effective):
- - Potassium nitrate 5%
- - Potassium chloride 3.75%
- - Potassium citrate 5.75
- Strontium chloride
- Amorphous calcium phosphate (Recaldent)