Toothpaste

- Includes pastes (opaque) and gels (translucent)
- Differ from products such as fluoride gels because they contain added ingredients that assist in plaque and stain removal during brushing

Determinants of Long-Term Health

- Access to good health care
  - Competent dental professionals
  - Sufficient number dental professionals
  - Distribution dental professionals
  - Preventive focus
- Environment
  - Economy
  - Education
  - Environmental policy
  - Health systems
  - Social systems
  - Access to oral health products
- Personal beliefs and behaviour
  - Toothbrushing
  - Toothpastes

Evolution of Toothpaste – Evolved Separately to Toothbrushing

- Egyptians made tooth powders from 5000BC
- 1873 first mass produced toothpaste (jars)
- 1892 first toothpaste in collapsible tubes (Dr Sheffields Creme Dentifrice – USA)
- Sheffield’s company later becomes Colgate
- Fluoride added in 1950s – approved by AmDA Council on Dental Therapeutics 1960
- Present day – added benefits (desensitising, whitening, xerostomia-relief, multi-benefit)

Toothpaste Ingredients

- 20-35% Water
- 20-40% Humectant – keeps paste moist
- 5-50% Abrasives – remove stain and plaque and polish teeth
- 1-3% Detergents – reduce surface tension, enhance cleaning, loosen food particles
- 1-3% Flavours – fresh, clean taste and after-taste – no Colgate toothpaste contains sugar
- 1-2% Colouring, Binders (stabilise and hold ingredients together), Opacifiers
- Therapeutic agents – Fluoride, Triclosan, Arginine/Calcium Carbonate, Potassium Nitrate, Pyrophosphate, Peroxide

Abrasives

- Remove stains and plaque – in all toothpastes
- Most commonly – Silica
- RDA (radioactive dentine abrasivity) acceptable standard ≤250

SLS

- Most common surfactant used in toothpastes
- Sensitivity to SLS is not widespread – more common in people with xerostomia

Fluoride concentrations

- Stannous fluoride, sodium monofluorophosphate and sodium fluoride all have comparable clinical efficacy
- 400-500ppm: low concentration fluoride for children up to 6 years to lower fluorosis risk
- 1000-1500ppm: maximum concentration of fluoride found in toothpastes in supermarkets
- 5000ppm: available through pharmacy and dental professionals – for high risk patients

Fluoride Safety

- ARCPHO Guidelines recommendations regarding toothpaste:
  - ≤17months: brushing without toothpaste
  - 18months-5years: twice daily brushing with low fluoride toothpaste (400-500ppm). Use pea-sized amount of toothpaste and brush with adult supervision. Children should spit out, not swallow and not rinse
  - ≥6years: twice daily brushing with 1000 - 1500ppm toothpaste. Toothpaste should be spat out, not swallowed and not rinsed.
  - Children in non-fluoridated areas or those at higher risk of caries – recommendations should be validated based on dental professional advice
  - Teenagers, adults and older adults at higher risk of caries – dental professional advice regarding use of toothpaste containing ≥1000 -1500ppm and up to 5000ppm fluoride.
Triclosan/co-polymer
- Broad spectrum antibacterial – only when combined with co-polymer can offer extended antibacterial action in the mouth
- Extensive clinical research shows proven efficacy:
  - Reduces gingival bleeding and gingival inflammation
  - Assists in the prevention and treatment of gingivitis
  - Assists in the management of periodontitis by slowing its progression
  - Reduces supra-gingival calculus
  - Protects against decay and cavities

Mode of action:
- Anti-microbial effect – Triclosan
- Anti-inflammatory effect – Triclosan
- Substantivity – PVM/MA copolymer
- Safety – no evidence of triclosan resistance with long-term use

Arginine/calcium carbonate for caries
- Arginine is a natural amino acid found in saliva
- Compatible with fluoride
- Arginine is used by some plaque bacteria to form ammonia which increases the plaque pH
- Calcium is the first mineral lost from the tooth during acid attack - it helps promote remineralisation
- Pro-Argin™ Technology complements fluoride by reducing demineralisation and increasing remineralisation beyond the benefit of fluoride alone
- Clinical studies of toothpaste with Pro-Argin™ and 1450ppm Fluoride show:
  - 20% less new cavities at 2 years13, 14
  - Reduced early decay by half 15, 16
  - 4 times greater remineralisation compared with regular fluoride toothpaste 17

Arginine/calcium carbonate for Hypersensitivity
- Arginine is a bipolar molecule that interacts with calcium carbonate and promotes the precipitation of calcium and phosphate on the dentine surface forming an acid-resistant layer that blocks open tubules
- Provides immediate relief from dentine sensitivity when directly applied to each sensitive tooth with a fingertip for 1 minute
- Provides long-lasting relief from dentine sensitivity when used twice daily
- Provides superior relief compared to potassium-based toothpastes

Potassium Salts (potassium nitrate and potassium citrate)
- Dentine sensitivity results from exposed dentine surfaces and open dentinal tubules
- Act to desensitise pulp nerve fibres stimulated by fluid movement in open tubules

Pyrophosphates
- Prevent calculus formation by inhibiting crystal growth in plaque

Peroxide (hydrogen peroxide and carbamide peroxide)
- Historically, whitening toothpastes only contained higher levels of abrasives to remove extrinsic stains. More recently peroxide has been added to whiten teeth by breaking down intrinsic stains

References
10. Naccache et al. 1992
11. Barnhart et al. 1974

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