

Lactodyne toothpaste vs. popular toothpaste brands: which one is safe to brush our teeth with?

Radhika Jitendra Mahale, Neha kothawade

¹Department of pharmaceuticals

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY OF PHARMACY, LONERE.RAIGAD.
INDIA.

Submitted: 01-01-2023

Accepted: 08-01-2023

ABSTRACT

When we thought it was safe to brush our teeth with our trusted and popular tooth paste brands, we couldn't seem to avoid harmful cancer-causing chemicals. Harmful ingredients such as triclosan and sodium lauryl sulphate are present in almost all popular toothpaste brands and make toothpaste toxic for our health.

Triclosan is an ingredient added to toothpaste that is intended to reduce or prevent bacteria. Although triclosan has antibacterial benefits that help prevent gingivitis, this chemical has been linked to antibiotic resistance and endocrine disruption. Triclosan may also lead to skin cancer.

Endocrine-disrupting chemical triclosan is a serious health concern because it can promote several health problems, including breast, ovarian, prostate, and testicular cancer. In addition, the endocrinedisrupting chemical triclosan is linked to preterm and low birth weight babies, advanced puberty in girls, and undescended testicles in boys. Clinical studies have shown that exposure to high doses of triclosan may disrupt thyroid function. Sodium lauryl sulfate, another ingredient in toothpaste also known as sodium laureth chemicals, is a surfactant or wetting agent that is added to toothpaste to help it spread easily throughout our mouth and make it bubble and foam. Sodium laureth sulphate is also used in detergents, fabric softeners, paints, laxatives, insecticides, and more.

Evidence supports the fact that sodium lauryl or laureth sulphate can cause cancer. Based on these facts, Lactodyne Toothpaste: A tooth paste with no cancer-causing agents for a healthy and beautiful smile has been developed by the R&D Center, Lactonova Nutripharm (P) Ltd., Hyderabad. The present paper reviews the role of LACTODYNE TOOTHPASTE to clean and maintain the aesthetics and health of teeth for a healthy and beautiful smile.

Keywords: lactodyne toothpaste, triclosan

I. INTRODUCTION:

Toothpaste is a paste or gel dentifrice used with a toothbrush to clean and maintain the aesthetics and health of teeth. Toothpaste is used to promote oral hygiene: it is an abrasive that aids in removing dental plaque and food from the teeth, assists in suppressing halitosis, and delivers active ingredients (most commonly fluoride) to help prevent tooth decay (dental caries) and gum disease.

(gingivitis). [1] Salt and sodium bicarbonate (baking soda) are among the materials that can be substituted for commercial toothpaste. Large amounts of swallowed toothpaste can be toxic. [2-3] (Fig 1)



Gum disease

In addition to 20%–42% water, toothpastes are derived from a variety of components, the three main ones being abrasives, fluoride, and detergents.

Abrasives

Abrasives constitute at least 50% of a typical toothpaste. These insoluble particles are designed to help remove plaque from the teeth. The removal of plaque and calculus prevents the accumulation of tartar and is widely claimed to help minimise cavities and periodontal disease, although the clinical significance of this benefit is debated. [4] Representative abrasives include particles of aluminium hydroxide (AlOH), calcium carbonate (CaCO₃), various calcium hydrogen phosphates, various silicas and zeolites, and hydroxyapatite (Ca₅(PO₄)₃OH).

Abrasives, like the dental polishing agents used in dentists' offices, also cause a small amount of enamel erosion, which is termed "polishing" action. Some brands contain powdered white mica, which acts as a mild abrasive and also adds a cosmetically pleasing glittery shimmer to the paste. The polishing of teeth removes stains from tooth surfaces but has not been shown to improve dental health over and above the effects of the removal of plaque and calculus. [5]

The abrasive effect of toothpaste is indicated by its RDA value. Too-high RDA values are deleterious.

Some dentists recommend toothpaste with an RDA value no higher than 50 for daily use.

Fluoride, in various forms, is the most popular active ingredient in toothpaste to prevent cavities. Fluoride is present in small amounts in plants, animals, and some natural water sources. The additional fluoride in toothpaste has beneficial effects on the formation of dental enamel and bones. Sodium fluoride (NaF) is the most common source of fluoride, but stannous fluoride (SnF₂), olaflur (an organic salt of fluoride), and sodium monofluorophosphate (Na₂PO₃F) are also used. Stannous fluoride has been shown to be more effective than sodium fluoride in reducing the incidence of dental caries [6] and controlling gingivitis, but it causes somewhat more surface stains. [7]

Much of the toothpaste sold has 1,000 to 1,100 parts per million of fluoride. In European countries, such as the UK or Greece, the fluoride content is often higher; a NaF content of 0.312% w/w (1,450 ppm fluoride) is common. All of these concentrations are likely to prevent tooth decay, according to a 2019 Cochrane review. [8] Concentrations below 1,000 ppm are not likely to be preventive, and the preventive effect increases with concentration. Clinical trials support the use of high fluoride dentifrices [9] as it was found to reduce the amount of plaque accumulated, decrease

the number of mutans streptococci and lactobacilli, and possibly promote calcium fluoride deposits to a higher degree than after the use of traditional fluoride-containing dentifrices. [10] However, these effects must be balanced with the increased risk of harm at higher concentrations. [9]

Surfactants

Many toothpastes, although not all, contain sodium lauryl sulphate (SLS) or related surfactants (detergents). SLS is found in many other personal care products as well, such as shampoo, and is mainly a foaming agent, which enables uniform distribution of toothpaste, improving its cleansing power. [5]

Other components Antibacterial agents

Triclosan, an antibacterial agent, is a common toothpaste ingredient in the United Kingdom.

Triclosan or zinc chloride prevents gingivitis and, according to the American Dental Association, helps reduce tartar and bad breath. [1, 11] A 2006 review of clinical research concluded there was evidence for the effectiveness of 0.30% triclosan in reducing plaque and gingivitis. [12] Another Cochrane review in 2013 found that triclosan achieved a 22% reduction in plaque and, in gingivitis, a 48% reduction in bleeding gums. However, there was insufficient evidence to show a difference in fighting periodontitis, and there was no evidence either of any harmful effects associated with the use of triclosan toothpastes for more than 3 years. The evidence relating to plaque and gingivitis was considered to be of moderate quality, while that for periodontitis was of low quality. [13]

Flavorants:

Toothpaste comes in a variety of colours and flavors intended to encourage use of the product. The three most common flavorants are peppermint, spearmint, and wintergreen. Toothpaste flavoured with peppermint-anise oil is popular in the Mediterranean region. These flavours are provided by the respective oils, e.g., peppermint oil. [5] More exotic flavours include anethole anise, apricot, bubblegum, cinnamon, fennel, lavender, neem, ginger, vanilla, lemon, orange, and pine. Alternatively, unflavored toothpastes exist.

Remineralizers

Hydroxyapatite nanocrystals and a variety of calcium phosphates are included in formulations

for remineralization [14], i.e., the reformation of enamel

Miscellaneous components

Agents are added to suppress the tendency of toothpaste to dry into a powder. Included are various sugar alcohols, such as glycerol, sorbitol, or xylitol, or their related derivatives, such as 1,2-propylene glycol and polyethylene glycol. [15] Strontium chloride or potassium nitrate are included in some toothpastes to reduce sensitivity.

Two systemic meta-analysis reviews reported that arginine and calcium sodium phosphosilicate (CSPS)-containing toothpastes are also effective in alleviating dentinal hypersensitivity. [16, 17] Another randomised clinical trial found superior effects when both formulas were combined together. [18]

Sodium polyphosphate is added to minimise the formation of tartar. Another example of a component in toothpaste is Biotene, which has proven its efficiency in relieving the symptoms of dry mouth in people who suffer from xerostomia according to the results of two randomised clinical trials. [19, 20]

Chlorohexidine mouthwash has been popular for its positive effect on controlling plaque and gingivitis [21]; however, a systematic review studied the effects of chlorohexidine toothpastes and found insufficient evidence to support its use. Tooth surface discoloration was observed as a side effect upon using it, which is considered a negative side effect that can affect patients' compliance. [22]

Xylitol:

Some studies have demonstrated that toothpastes with xylitol as an ingredient are more effective at preventing dental caries in the permanent teeth of children than toothpastes containing fluoride alone. Furthermore, xylitol has not been found to cause any harmful effects. Further investigation into the efficacy of toothpastes containing this product is however required, as the currently available studies are of low quality and the results of such studies must be applied carefully. [23]

Fluoride

-containing toothpaste can be acutely toxic if swallowed in large amounts, but instances are exceedingly rare and result from prolonged and excessive use of toothpaste (i.e., several tubes per week). [26] Approximately 15 mg/kg of body weight is the acute lethal dose, even though a small

amount like 5 mg/kg may be fatal to some children. [27]

The risk of using fluoride is low enough that the use of full-strength toothpaste (1350–1500 ppm fluoride) is advised for all ages. However, smaller volumes are used for young children, for example, a smear of toothpaste until three years old. A major concern with dental fluorosis is children under 12 months ingesting excessive fluoride through toothpaste. Nausea and vomiting are also problems that might arise with topical fluoride ingestion.

Reports

have suggested triclosan, an active ingredient in many kinds of toothpastes, can combine with chlorine in tap water to form chloroform [30], which the United States Environmental Protection Agency classifies as a probable human carcinogen. An animal study revealed the chemical might modify hormone regulation, and many other lab studies proved bacteria might be able to develop resistance to triclosan in a way that can help them resist antibiotics as well. [31]

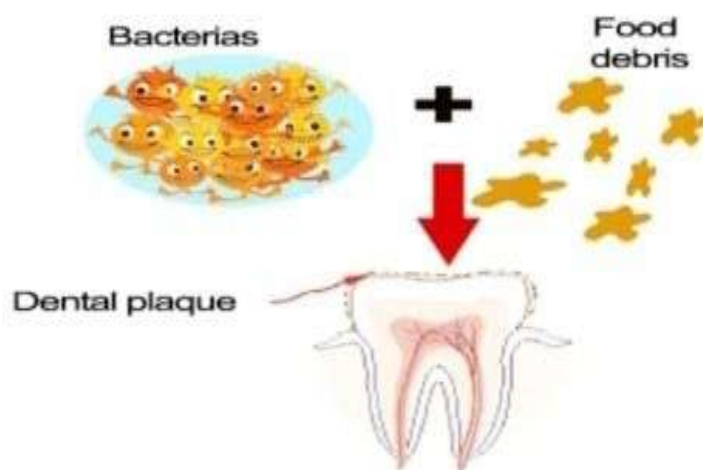
Polyethylene glycol

(PEG) is a common ingredient in some of the formulas of toothpastes; it is a hydrophilic polymer that acts as a dispersant in toothpastes. Also, it is used in many cosmetic and pharmaceutical formulas, for example: ointments, osmotic laxatives, some of the nonsteroidal anti-

inflammatory drugs, other medications, and household products. [32] However, 37 cases of PEG hypersensitivity (delayed and immediate) to PEG-containing substances have been reported since 1977 [33], suggesting that they have unrecognised allergenic potential. [33]

Miscellaneous issues and debates

With the exception of toothpaste intended to be used on pets such as dogs and cats, and toothpaste used by astronauts, most toothpaste is not intended to be swallowed, and doing so may cause nausea or diarrhea. Tartar fighting toothpastes have been debated. [34] Case reports of plasma cell gingivitis have been reported with the use of herbal toothpaste containing cinnamon. [35] Sodium lauryl sulfate (SLS) has been proposed to increase the frequency of mouth ulcers in some people, as it can dry out the protective layer of oral tissues, causing the underlying tissues to become damaged. [36] In studies conducted by the university of Oslo on recurrent aphthous ulcers, it was found that SLS has a denaturing effect on the oral mucin layer, with high affinity for proteins, thereby increasing epithelial permeability. [37] In a double-blind cross-over study, a significantly higher frequency of aphthous ulcers was demonstrated when patients brushed with an SLS-containing versus a detergent-free toothpaste. Also patients with Oral Lichen Planus who avoided SLS-containing toothpaste benefited. [38, 39]



Alteration of taste perception

After using toothpaste, orange juice and other juices have an unpleasant taste. Sodium

lauryl sulphate alters taste perception. It can break down phospholipids that inhibit taste receptors for sweetness, giving food a bitter taste. In contrast,

apples are known to taste more pleasant after using toothpaste. [40] Distinguishing between the hypotheses that the bitter taste of orange juice results from stannous fluoride or from sodium lauryl sulphate is still an unresolved issue, and it is thought that the menthol added for flavour may also play a part in the alteration of taste perception when binding to lingual cold receptors.

Whitening toothpastes

Many toothpastes make whitening claims. Some of these toothpastes contain peroxide, the same ingredient found in tooth bleaching gels. The abrasive in these toothpastes, not the peroxide, removes the stains. [41] Whitening toothpaste cannot alter the natural colour of teeth or reverse discoloration by penetrating surface stains or decay. To remove surface stains, whitening

toothpaste may include abrasives to gently polish the teeth or additives such as sodium tripolyphosphate to break down or dissolve stains. When used twice a day, whitening toothpaste typically takes two to four weeks to make teeth appear whiter. Whitening toothpaste is generally safe for daily use, but excessive use might damage tooth enamel. Teeth-whitening gels represent an alternative. [42] A recent systematic review in 2017 concluded that nearly all dentifrices that are specifically formulated for tooth whitening were shown to have a beneficial effect in reducing extrinsic stains, irrespective of whether or not a chemical discoloration agent was added. [43] However, the whitening process can permanently reduce the strength of the teeth as it scrapes away a protective outer layer of enamel.

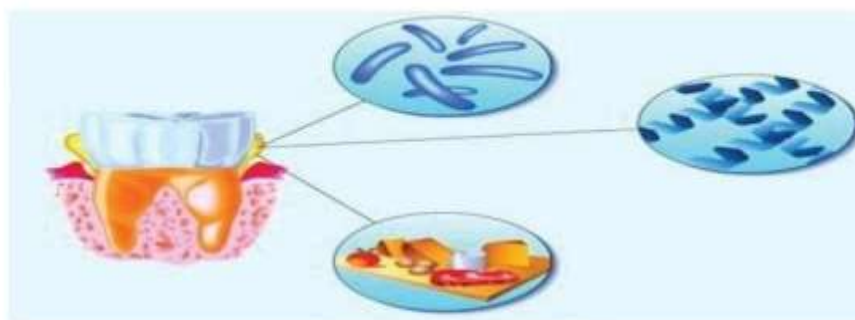


Fig-3
whitening tooth

Herbal and natural toothpastes:



Fig-4 Lactodyne

Many herbal toothpastes do not contain sodium lauryl sulfate. The ingredients found in natural toothpaste Lactodyne contains activated charcoal, probiotics, sodium fluoride, and calcium carbonate. Lactodyne Toothpaste: A tooth paste with no cancer-causing agents for a healthy and beautiful smile.

According to a study by the Indian Dental Association, many of the herbal toothpastes being

sold in India were adulterated with nicotine, whereas lactodyne toothpaste does not contain the habit-forming addiction carcinogen drug nicotine.

Lactodyne toothpaste with activated charcoal absorbs plaque and other compounds that strain teeth. When activated charcoal is applied to teeth, it whitens them by binding with rough materials on top of the teeth.

Lactodyne toothpaste Charcoal becomes "activated" when high temperatures are mixed with gas. This combination causes it to expand and become porous, trapping the impurities around it. It is not harmful and has proven medical benefits.

MODE OF ACTION OF PROBIOTICS IN LACTODYNE TOOTHPASTE

Tooth decay is one of the most common chronic diseases. The problem is, we've been looking at it the wrong way. For a long time, we've known it's caused by bacteria.

Streptomutans are fast eaters and prefer to eat simple sugars. When you feed them sugar, they eat it and produce acids. These acids change the pH of the mouth. This pH change can result in calcium being pulled from your teeth. Strepto mutans breaks your tooth open and burrows in, starting the stage of tooth decay. Streptomutans is the most recognised oral pathogen, but there are many more. They play a role in invading your tooth surface via dental plaque. This eventually causes tooth decay. Streptomutans creates an acidic, low-oxygen environment in the lesion. This fuels the decay and attracts select species of lactobacilli from food or the oral flora.

Oral Probiotics in Lactodyne: Benefits to Prevent Tooth Decay

The benefits of oral probiotics are linked to the role of oral flora in the mouth. One of the main benefits of oral probiotics is that they help maintain those defenses. They also actively fight harmful bacteria. feed and replace the other microbes in the oral flora. These "good" bugs help keep the harmful ones in check. It's all a question of balance. Providing good microflora in the mouth leads to a balance between good and bad bacteria, which leads to healthy teeth.

II. SUMMARY AND CONCLUSION

Harmful ingredients such as triclosan and sodium lauryl sulphate are present in almost all popular toothpaste brands and make toothpaste toxic for our health. Triclosan is an ingredient added to toothpaste that is intended to reduce or prevent bacteria. Although triclosan has antibacterial benefits that help prevent gingivitis, this chemical has been linked to antibiotic resistance and endocrine disruption. Triclosan may also lead to skin cancer. Endocrinedisrupting chemical triclosan is a serious health concern because it can promote several health problems, including breast, ovarian, prostate, and testicular

cancer. In addition, the endocrine-disrupting chemical triclosan is linked to preterm and low birth weight babies, advanced puberty in girls, and undescended testicles in boys.

Clinical studies have shown that exposure to high doses of triclosan may disrupt thyroid function. Sodium lauryl sulfate, another ingredient in toothpaste also known as sodium laureth chemicals, is a surfactant or wetting agent that is added to toothpaste to help it spread easily throughout our mouth and make it bubble and foam. Sodium laureth sulphate is also used in detergents, fabric softeners, paints, laxatives, insecticides, and more. Evidence supports the fact that sodium lauryl or laureth sulphate can cause cancer.

Herbal toothpastes do not contain sodium lauryl sulfate. The ingredients found in natural toothpastes vary widely but often contain activated charcoal, probiotics, sodium fluoride, and calcium carbonate. Lactodyne toothpaste: A tooth paste with no cancer-causing agents for a healthy and beautiful smile. According to a study by the Indian Dental Association, many of the herbal toothpastes being sold in India were adulterated with nicotine, whereas lactodyne toothpaste does not contain the habit-forming addiction carcinogen drug nicotine. Lactodyne toothpaste with activated charcoal absorbs plaque and other compounds that strain teeth. When lactodyne-activated charcoal is applied to teeth, it whitens them by binding rough materials on top of the teeth.

REFERENCES

- [1]. American Dental Association Description of Toothpaste "Toothpaste." 15. 2010
- [2]. National Library of Medicine. National Institutes of Health Retrieved July 7, 2014.
- [3]. Valkenburg C, Slot DE, Bakker EW, and Van der Weijden FA Does using dentifrice help remove plaque? "A systematic review." *Journal of Clinical Periodontology*, 43 (12), 2016: 1050–1058. doi:10.1111/jcpe.12615. PMID 27513809.
- [4]. Hujoel PP. Historical perspectives on advertising and the meme that personal oral hygiene prevents dental caries *Gerodontology*, 36(1), 2019, 36–44. doi:10.1111/ger.12374; PMID 30318791. .
- [5]. Weinert W., "Oral Hygiene Products." *Ullmann's Encyclopedia of Industrial Chemistry* Weinheim: Wiley-VCH 2005.

- doi:10.1002/14356007.a18_209. ISBN 3527306730.
- [6]. Nevitt GA, Witter DH, and Bowman WD. "Topical Applications of Sodium Fluoride and Stannous Fluoride." *Public Health Reports*, 73 (9), 1958, 847–50 doi:10.2307/4590256, JSTOR 4590256, PMC 1951625, PMID 13579125.
- [7]. Perlich MA, Bacca LA, Bollmer BW, Lanzalaco AC, McClanahan SF, Sewak LK, Beiswanger BB, Eichold WA, Hull JR, Jackson RD. "The clinical effect of a stabilised stannous fluoride dentifrice on 7. plaque formation, gingivitis, and gingival bleeding: a sixmonth study." *The Journal of Clinical Dentistry*. 6, 1995, 54–8, PMID 8593194.
- [8]. "Fluoride toothpastes of different strengths for preventing tooth decay." www.cochrane.org. Retrieved April 7, 2020.
- [9]. Walsh T, Worthington HV, Glenny AM, Marinho VC, and Jeronic A. "Fluoride toothpastes of different concentrations for preventing dental caries." *The Cochrane Database of Systematic Reviews*. 3, 2019. CD007868. doi:10.1002/14651858.CD007868.pub3. PMC 6398117. PMID 30829399.
- [10]. Ekstrand KR. "High Fluoride Dentifrices for Elderly and Vulnerable Adults: Does It Work and if So, Then Why?" *Caries Research*. 1(1), 2016, 15–21. doi:10.1159/000443021. PMID 27101401.
- [11]. Commissioner, Office of the. "Triclosan: What Consumers Should Know." FDA 17, 2010.
- [12]. Gunsolley JC. "A meta-analysis of six-month studies of antiplaque and antigingivitis agents". *Journal of the American Dental Association*. 137(12), 2006, 1649–57. doi:10.14219/jada.archive.2006.0110. PMID 17138709. Seventeen studies support the antiplaque, antigingivitis effects of dentifrices containing 0.30 percent triclosan, 2.0 percent Gantrez copolymer.
- [13]. Riley P, Lamont T. "Triclosan/copolymer containing toothpastes for oral health". *The Cochrane Database of Systematic Reviews* (12), 2013. CD010514.
- [14]. Calcium Phosphate Technologies from. Dentist.net. Retrieved on 4, 2013.
- [15]. Simon Quellen Field "Why There's Antifreeze in Your Toothpaste: The Chemistry of Household Ingredients" 2008, Chicago Review Press. ISBN 1-55652-697-0
- [16]. Yang ZY, Wang F, Lu K, Li YH, Zhou Z. "Arginine-containing desensitizing toothpaste for the treatment of dentin hypersensitivity: a meta-analysis". *Clinical, Cosmetic and Investigational Dentistry*. 8, 2016, 1–14. doi:10.2147/CCIDE.S95660. PMC 4708190. PMID 26793006.
- [17]. Hu ML, Zheng G, Zhang YD, Yan X, Li XC, Lin H. "Effect of desensitizing toothpastes on dentine hypersensitivity: A systematic review and meta-analysis". *Journal of Dentistry*. 75, 2018, 12–21. doi:10.1016/j.jdent.2018.05.012. PMID 29787782.
- [19]. Hall C, Mason S, Cooke J. "Exploratory randomised controlled clinical study to evaluate the comparative efficacy of two occluding toothpastes—a 5% calcium sodium phosphosilicate toothpaste and an 8% arginine/calcium carbonate toothpaste—for the longerterm relief of dentine hypersensitivity." *Journal of Dentistry*, 60 (2017), 36–43. doi:10.1016/j.jdent.2017.02.009. PMID 28219674.
- [20]. Rantanen I, Tenovuo J, Pienihäkkinen K, and Söderling E. "Effects of a betainecontaining toothpaste on subjective symptoms of dry mouth: a randomised clinical trial." *The Journal of Contemporary Dental Practice*, 4(2), 2003, 11–23. doi:10.5005/jcdp-4-2-11. PMID 12761586.
- [21]. Epstein JB, Emerton S, Le ND, Stevenson-Moore P. "A double-blind crossover trial of Oral Balance gel and Biotene toothpaste versus placebo in patients with xerostomia following radiation therapy." *Oral Oncology*. 35(2), 1999, 132–7. doi:10.1016/S1368-8375(98)00109-2. PMID 10435146.
- [22]. James P, Worthington HV, Parnell C, Harding M, Lamont T, Cheung A, Whelton H, Riley P. "Chlorhexidine mouthrinse as an adjunctive treatment for gingival health." *The Cochrane Database of Systematic Reviews*. 3, 2017.

- CD008676.
doi:10.1002/14651858.CD008676.pub2.
PMC 6464488. PMID 28362061.
- [23]. Slot DE, Berchier CE, Addy M, Van der Velden U, Van der Weijden GA. "The efficacy of chlorhexidine dentifrice or gel on plaque, clinical parameters of gingival inflammation and tooth discoloration: a systematic review". *International Journal of Dental Hygiene*. 12(1), 2014, 25–35.
- [24]. Riley P, Moore D, Ahmed F, Sharif MO, Worthington HV. "Xylitol-containing products for preventing dental caries in children and adults". *The Cochrane Database of Systematic Reviews* 2015.
- [25]. Canedy D. "Toothpaste a Hazard? Just Ask the F.D.A". *New York Times*. Retrieved 21, 2008.
- [26]. *Delivering Better Oral Health: An evidence-based toolkit for prevention*. NHS. UK, 2007.
- [27]. Roos J, Dumolard A, Bourget S, Grange L, Rousseau A, Gaudin P, Calop J, Juvin R. "[Osteofluorosis caused by excess use of toothpaste]". *Presse Médicale*. 34(20), 2005, 1518–20. doi:10.1016/S0755-4982(05)84216-2. PMID 16301964.
- [28]. Kidd E, Fejerskov O. *Essentials of Dental Caries*. Oxford University Press. 97, 2016. ISBN 978-0-19-873826-8.
- [29]. "Tainted toothpaste across the world", *New York Times*, 30, 2007.
- [30]. Bogdanich W (October 1, 2007). "The Everyman Who Exposed Tainted Toothpaste". *New York Times*.
- [31]. Rule KL, Ebbett VR, and Vikesland PJ. "Formation of chloroform and chlorinated organics by free-chlorine-mediated oxidation of triclosan." *Environmental Science & Technology*. 39(9), 2005, 3176–85. doi:10.1021/es048943+. PMID 15926568.
- [32]. Mukherjee K., "FDA Reviewing Triclosan, an Antibacterial Agent Found in Soap." Retrieved October 27, 2010.
- [33]. Fruijtier-Pölloth C., "Safety assessment on polyethylene glycols (PEGs) and their derivatives as used in cosmetic products." *Toxicology*, 214 (1–2), 2005, 1–38. doi:10.1016/j.tox.2005.06.001. PMID 16011869.
- [34]. Wenande E, Garvey LH. "Immediate-type hypersensitivity to polyethylene glycols: a review." *Clinical and Experimental Allergy*. 46 (7), 2016, 907–22. doi:10.1111/cea.12760. PMID 27196817
- [35]. "Tartar Fighting Toothpastes & Toxic Reactions." toxictoothpaste.org. Archived from the original on June 23, 2012.
- [36]. Anil S., "Plasma cell gingivitis among herbal toothpaste users: a report of three cases" (PDF). *The Journal of Contemporary Dental Practice*, 8(4), 2007, 60–6
- [37]. canker sores Archived February 8, 2006, at the Wayback Machine. Retrieved on April 4, 2013.
- [38]. Herlofson BB, Barkvoll P. "The effect of two toothpaste detergents on the frequency of recurrent aphthous ulcers." *Acta Odontologica Scandinavica*. 54(3), 1996, 150–3.
- [39]. Nikiforuk, Gordon. "5 Fluoride Dentifrices and Fluoride Rinses." *Understanding dental caries and prevention: basic and clinical aspects* Basel: Karger, 1985, 87–112.
- [40]. Barkvoll P, Rilla G. "Triclosan protects the skin against dermatitis caused by sodium lauryl sulphate exposure." *Journal of Clinical Periodontology*. 21(10), 1994, 717–9.
- [41]. DeSimone JA, Heck GL, and Bartoshuk LM. "Surface active taste modifiers: a comparison of the physical and psychophysical properties of gymnemic acid and sodium lauryl sulfate." *Chemical Senses*. 5(4), 1980, 317–330.
- [42]. Mayo Clinic Staff. "Whitening toothpaste: Does it actually whiten teeth?". Mayo Clinic. Archived from the original on April 3, 2008.
- [43]. Soeteman GD, Valkenburg C, Van der Weijden GA, Van Loveren C, Bakker E, Slot DE. "Whitening dentifrice and tooth surface discoloration: a systematic review and metaanalysis." *International Journal of Dental Hygiene*. 16(1), 2018, 24–35. doi:10.1111/idh.12289. PMID 28573755.
- [44]. "Are yellow teeth stronger?" sciencefocus.com.