

The role of sugarfree gum in oral health

A clinical overview



Working for better oral healthcare



What we will cover today

- The link between diet, nutrition and dental caries
- Saliva and its role in maintaining oral health
- The oral health benefits of sugarfree gum



The increasing global health burden of dental caries

The definition of dental caries has evolved

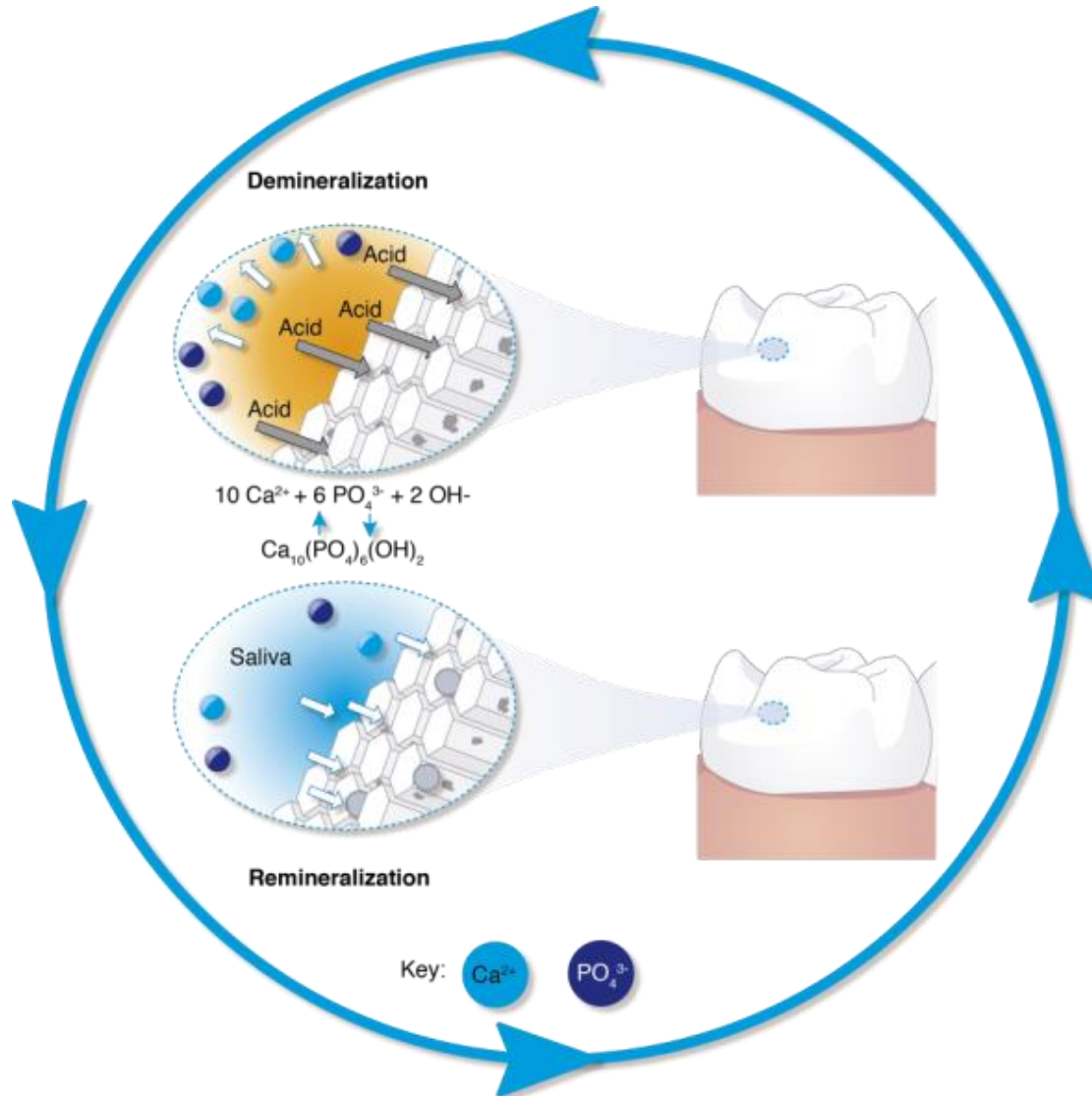
The World Health Organization:

“A localized, post-eruptive, pathological process of external origin involving softening of the hard tooth tissue and proceeding to the formation of a cavity”.¹



**World Health
Organization**

The CAMBRA definition is more detailed and reflects the caries balance¹



Dental caries remains the most common chronic disease across the world

Global prevalence rate of
35% for untreated caries
in permanent teeth¹

Dental cavities found in
 **60-90%**
of school children²

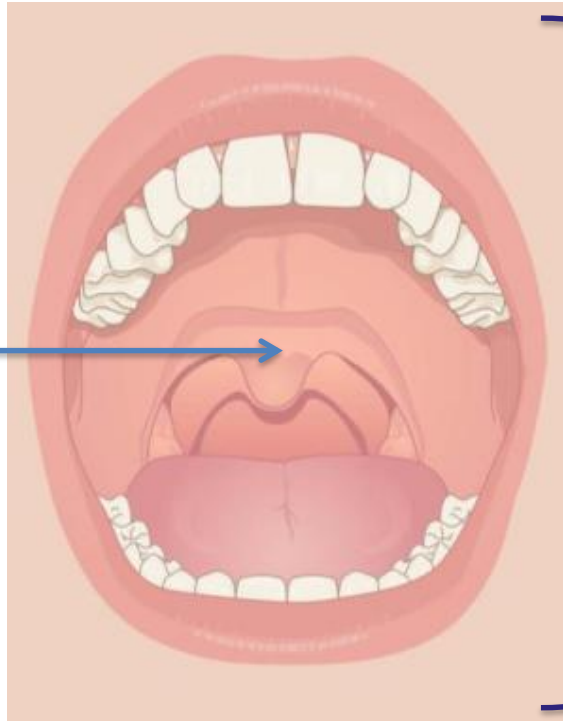
Almost  **30%** of 65- to 74-year-olds
have no natural teeth²



The development of dental caries is linked to many factors

Inside the mouth

- Bacterial composition of the biofilm
- Plaque pH
- Salivary flow rate (stimulated and unstimulated)
- Buffering effect of saliva
- Food retention
- Inorganic compounds (Ca^{2+} and PO_4^{3-})



Outside the mouth

General health

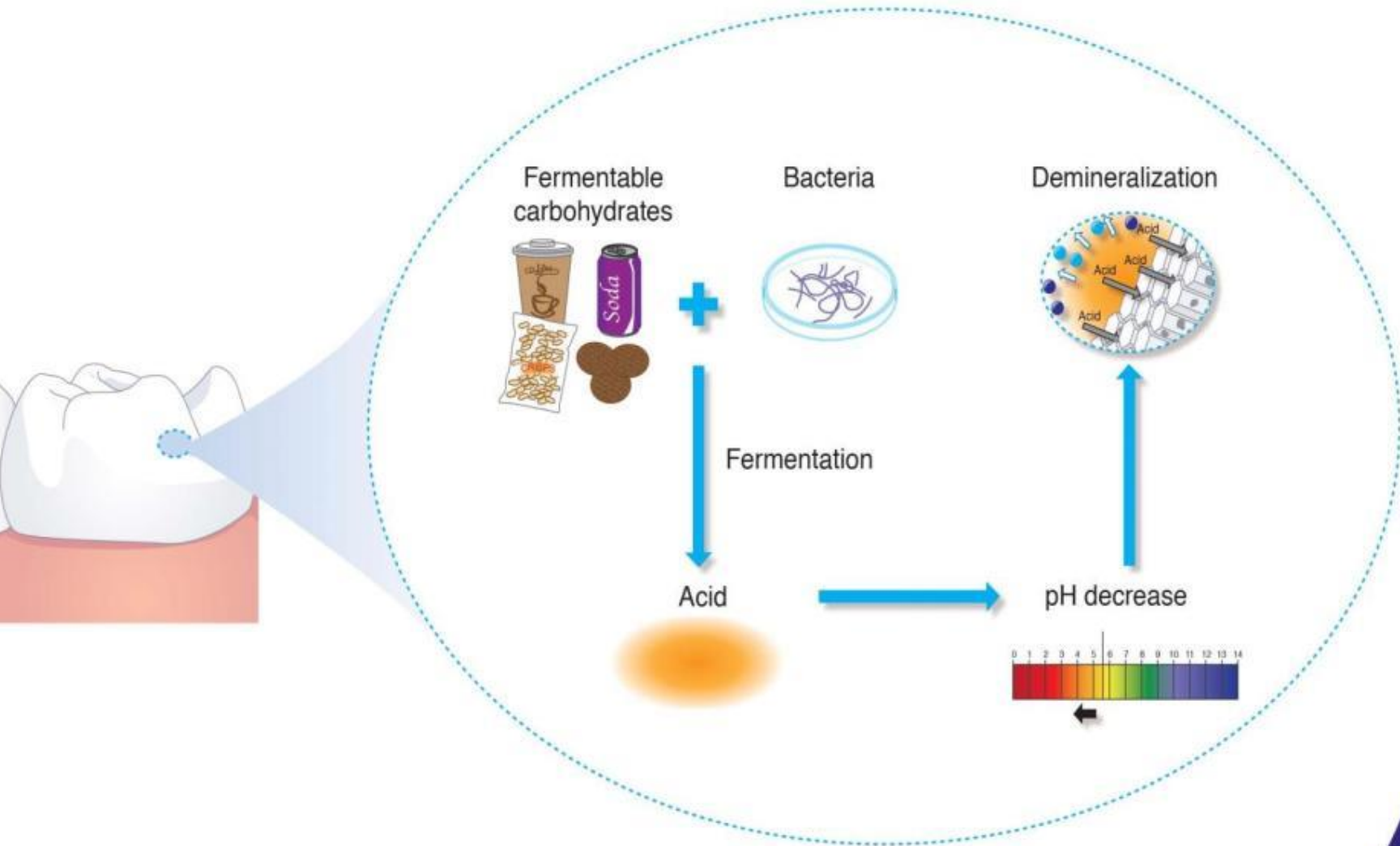
- Medical history
- Hormones
- Age
- Genetic heritage
- Medical treatment

Environment

- Diet
- Frequency of eating
- Oral hygiene
- Fluoride

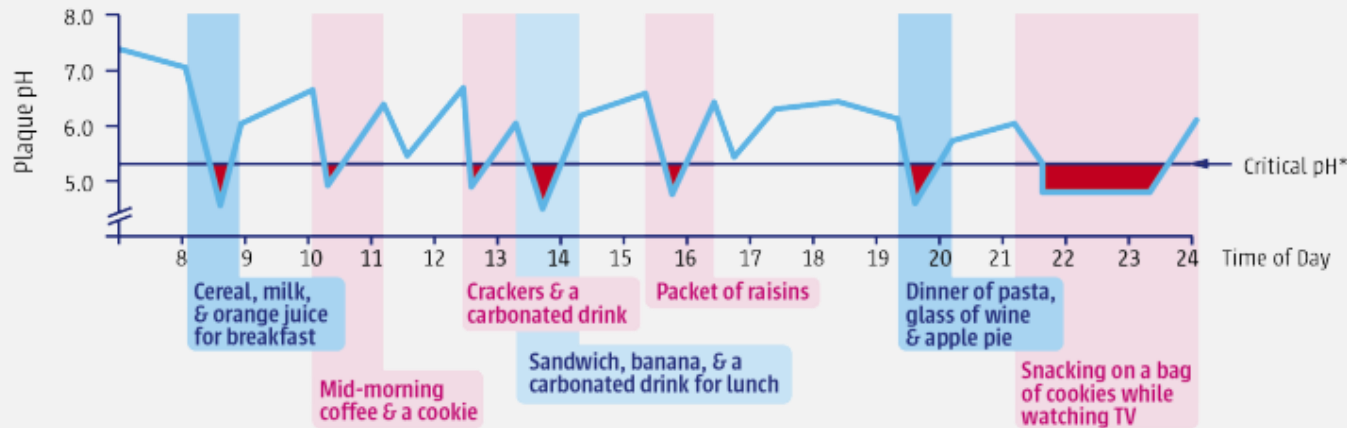
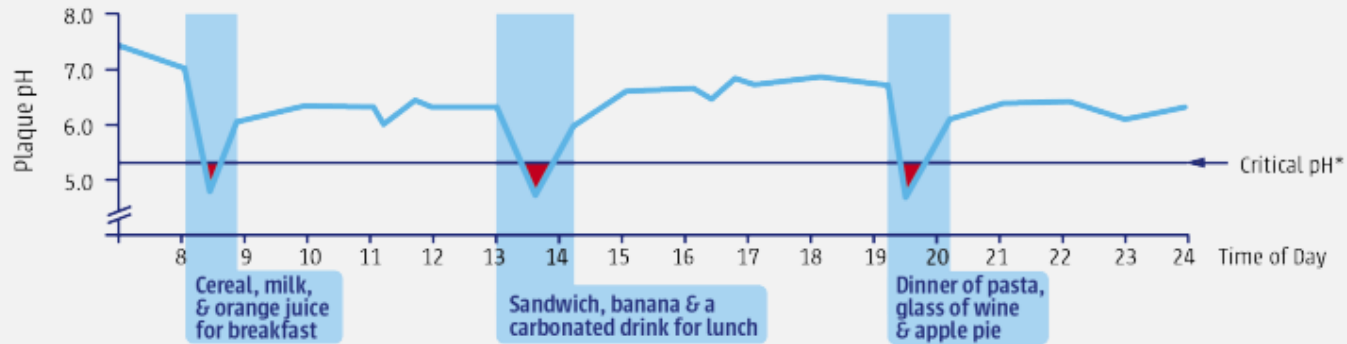
The link between diet, nutrition and dental caries

Diet acts locally to significantly impact oral health








1. Moynihan P, Petersen PE. Diet, nutrition and the prevention of dental diseases. *Public Health Nutr.* 2004;7:201-26.
2. Touger-Decker R, van Loveren C. Sugars and dental caries. *Am J Clin Nutr.* 2003;78(Suppl.):881S-92S.

Increased frequency of snacking leads to an increased risk of caries



A wide range of food and drinks are acidogenic

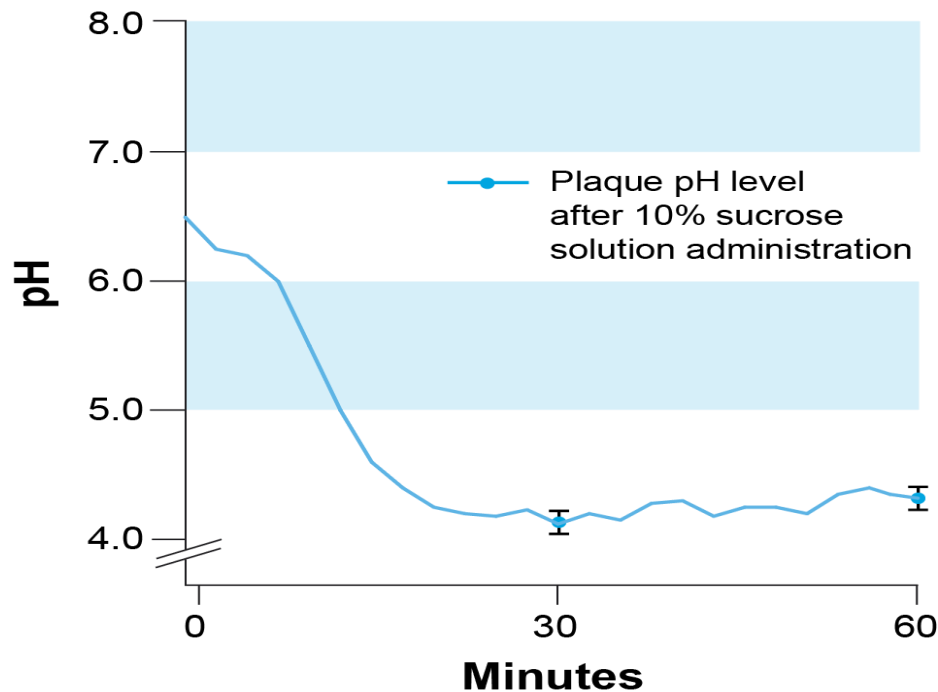
	Least acidogenic Group 1 -----> Most acidogenic Group 6					
 Fruit/Nuts	Peanuts	Apple	Banana	Dates Raisins		
 Starch-based foods		Bread with butter Potato chips	Cream-filled sandwich cookies Crackers Bagel Cream-filled light sponge cakes	Bread with jam Wholewheat bread Plain cookies Doughnuts Most cakes Breakfast cereal	Apple pie Chocolate cookies	
 Soft sweets	Caramels Chocolate Licorice	Jelly sweets				Fruit pastilles
 Hard sweets					Rock candy Clear mints	Boiled sweets
 Soft drinks	Milk	Chocolate-flavoured milk	Lemon & lime carbonated drink Cola carbonated drink	Apple juice (unsweetened) Orange juice (unsweetened)	Cola carbonated drink (rinse*)	

1. Edgar WM, Bibby BG, Mundorff S, Rowley J. Acid production in plaques after eating snacks: modifying factors in foods. *J Am Dent Assoc.* 1975;90:418-25.
2. Rugg-Gunn AJ, Edgar WM, Jenkins GN. The effect of eating some British snacks upon the pH of human dental plaque. *Br Dent J.* 1978;145:95-100.

Even small amounts of fermentable carbohydrate cause a drop in plaque pH

Results from a three-series study by Maiwald:¹

- After administration of a solution containing only 10% sucrose, plaque pH decreased drastically — reaching a pH of less than 4.5 after about 20 minutes.



Saliva and its role in maintaining oral health

The important role of saliva in oral health

Tooth:

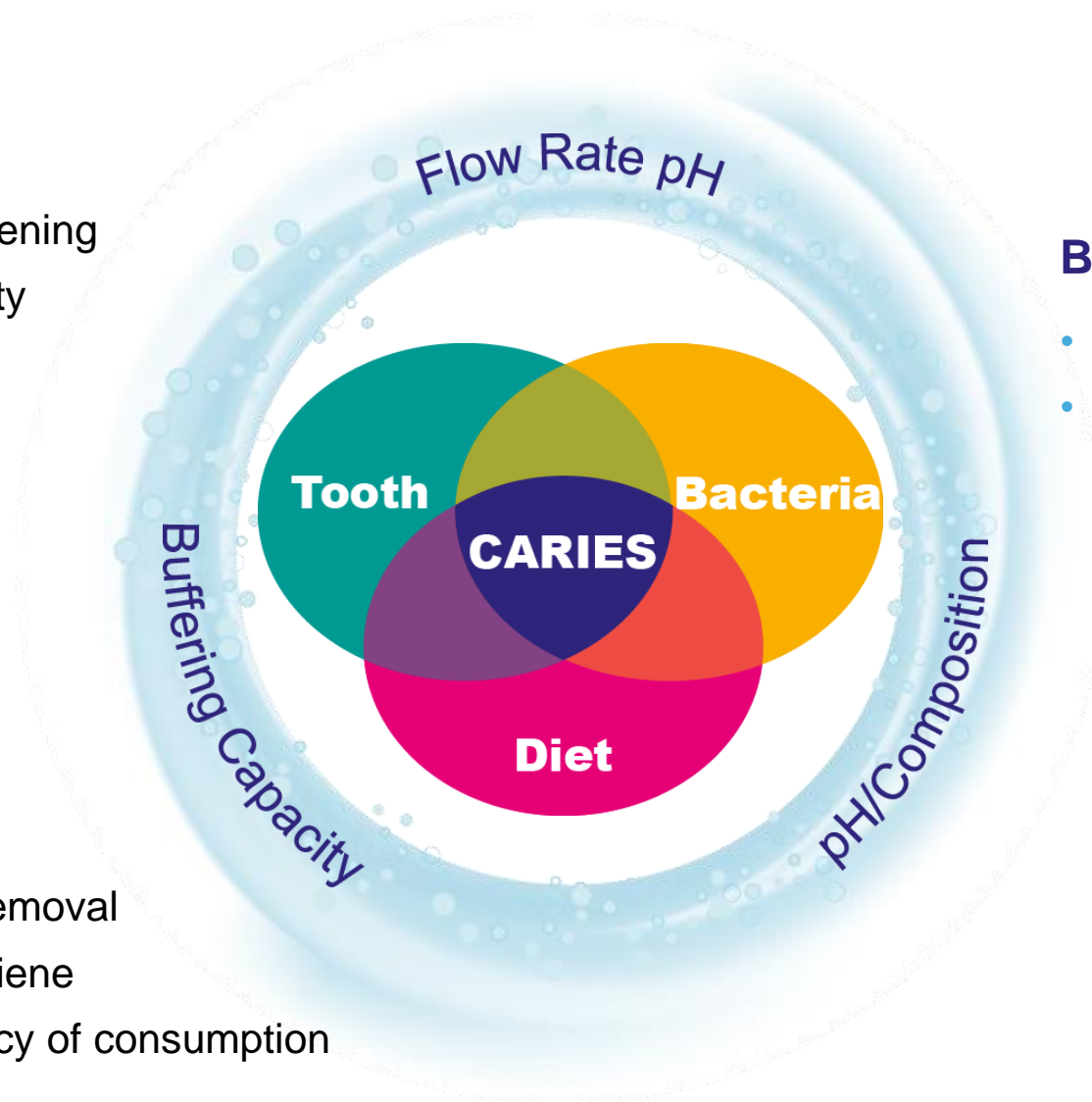
- Strengthening
- Sensitivity

Diet:

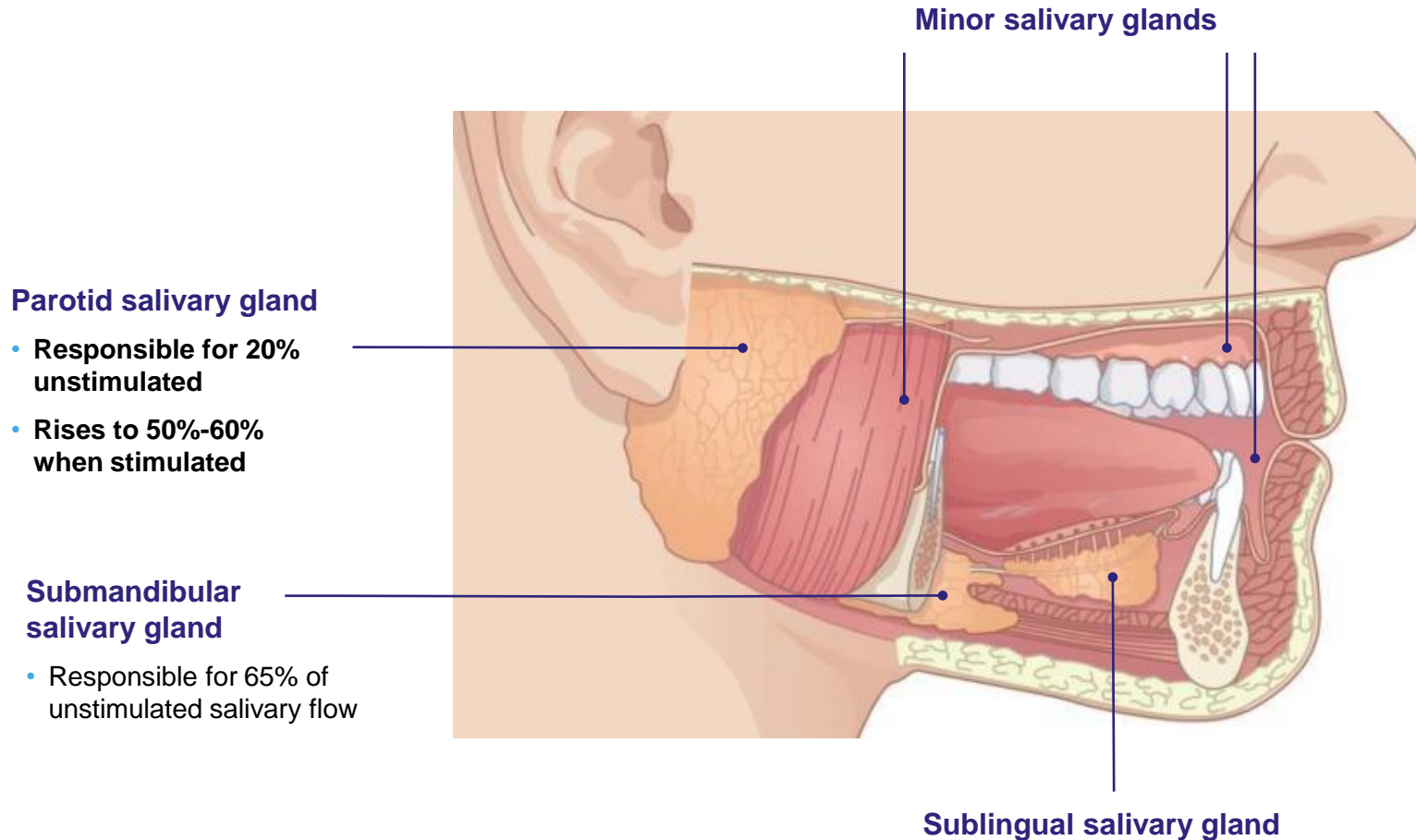
- Debris removal
- Oral hygiene
- Frequency of consumption

Bacteria:

- Germ kill (*S. mutans*)
- Germ replacement



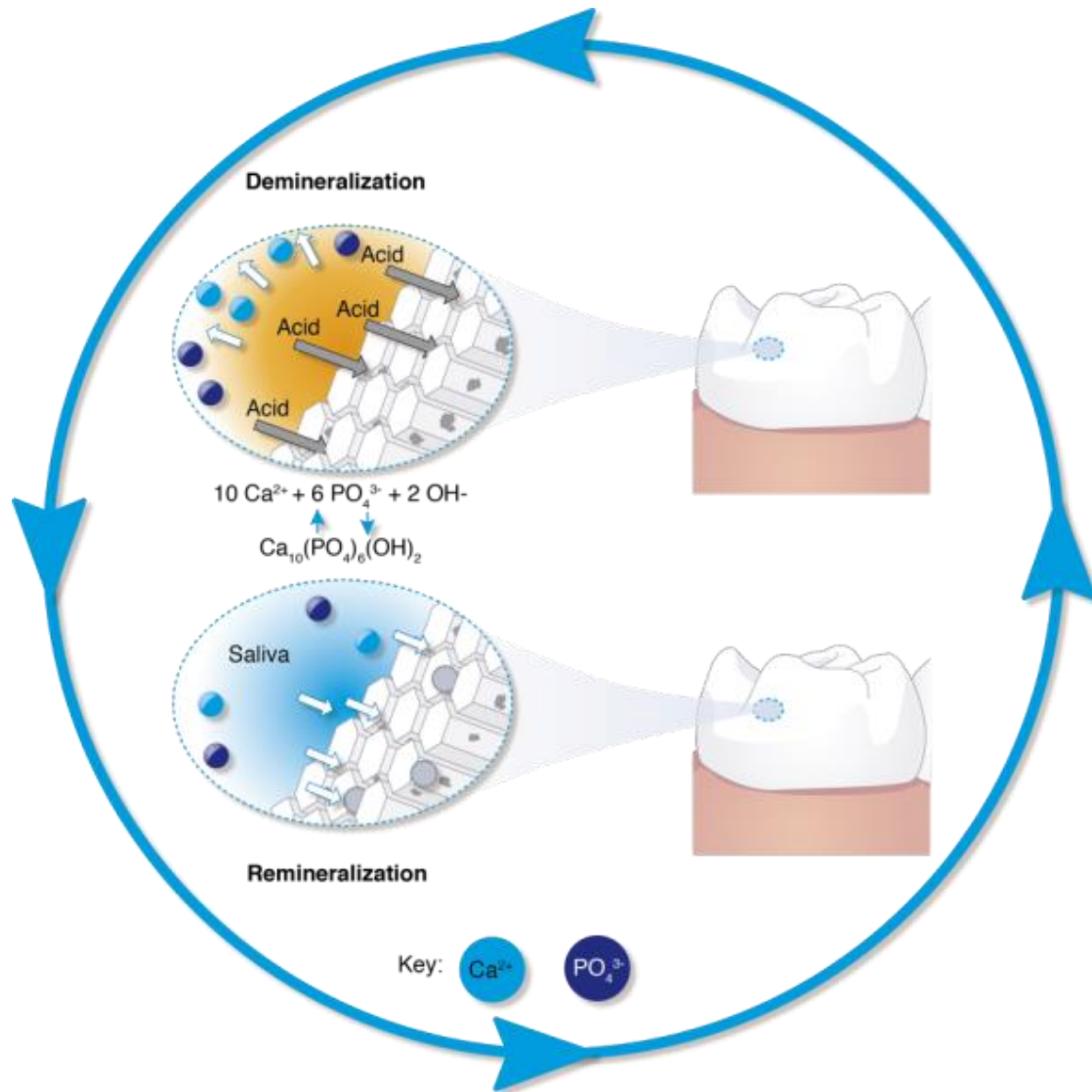
A quick refresher on salivary production



Higher levels of bicarbonate in stimulated saliva increase its protective benefits¹

	Unstimulated	Stimulated
Water	99.55%	99.53%
Solids	0.45%	0.47%
Flow Rate (ml/min)	0.32 ± 0.23	2.08 ± 0.84
pH	7.04 ± 0.28	7.61 ± 0.17
Inorganic (mmol/L)		
Sodium	5.76	20.76
Potassium	19.47	13.62
Calcium	1.32	1.47
Chloride	16.40	18.09
Bicarbonate	5.47	16.03
Phosphate	5.69	2.70

Saliva plays a key role in maintaining the balance between demineralization and remineralization



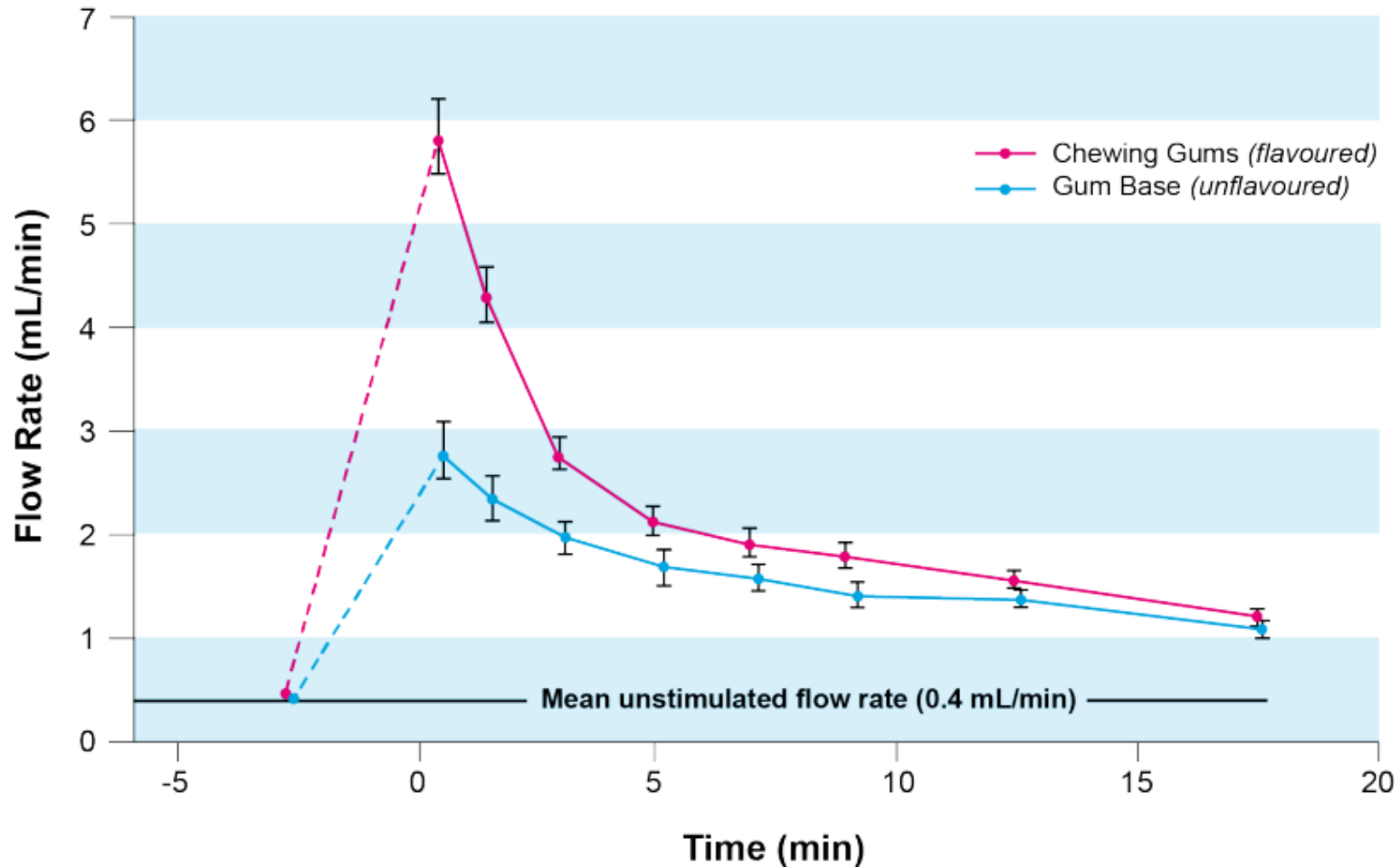
The oral health benefits of sugarfree gum

Sugarfree gum is largely composed of polyols and gum base

Formula	Ingredients	Function
40–65%	Polyols (e.g., sorbitol, mannitol, xylitol maltitol, isomalt)	Bulk sweetener (Volume, Substance)
20–25%	Gum Base (e.g. purified polymers, emulsifiers, resins)	Chew, Texture, Bolus, Flavor Carrier
5.10–18.5%	Gum Modifiers (e.g. glycerine, HSH, sorbitol solution, fats and oils)	Softener
0.66–1.7%	Flavorings (e.g. mint, menthol)	Taste



Chewing sugarfree gum stimulates saliva flow >10 times the resting rate

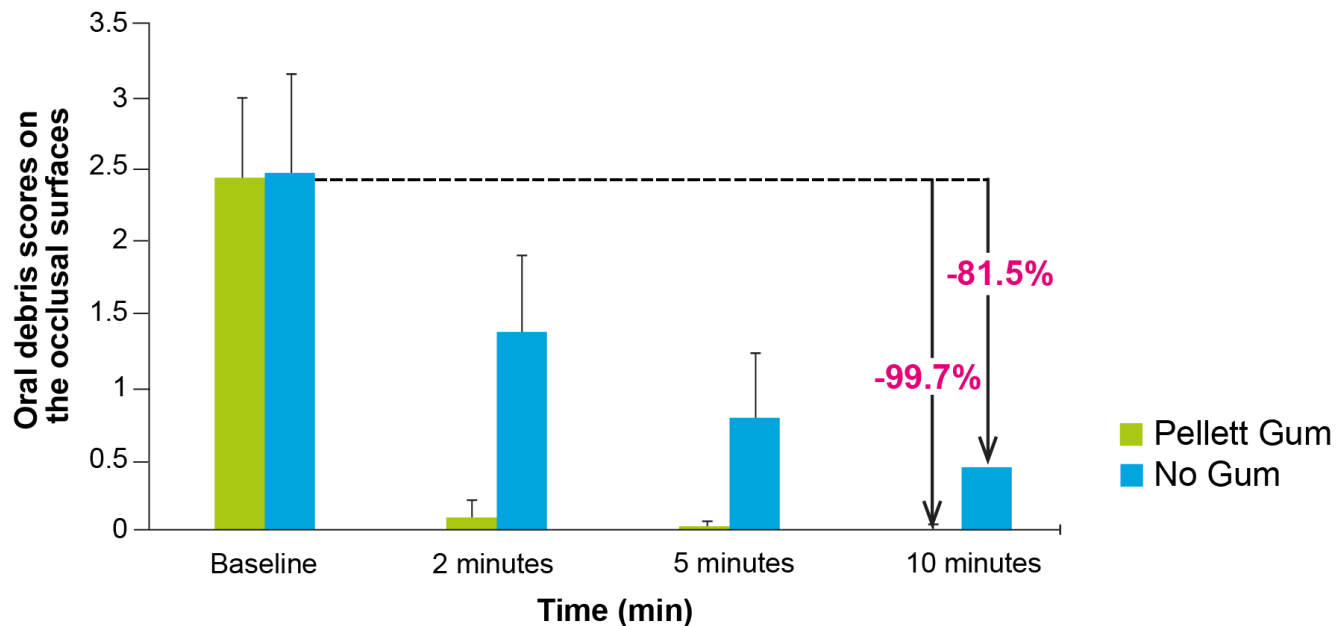


Stimulated saliva helps remove food debris from susceptible tooth surfaces

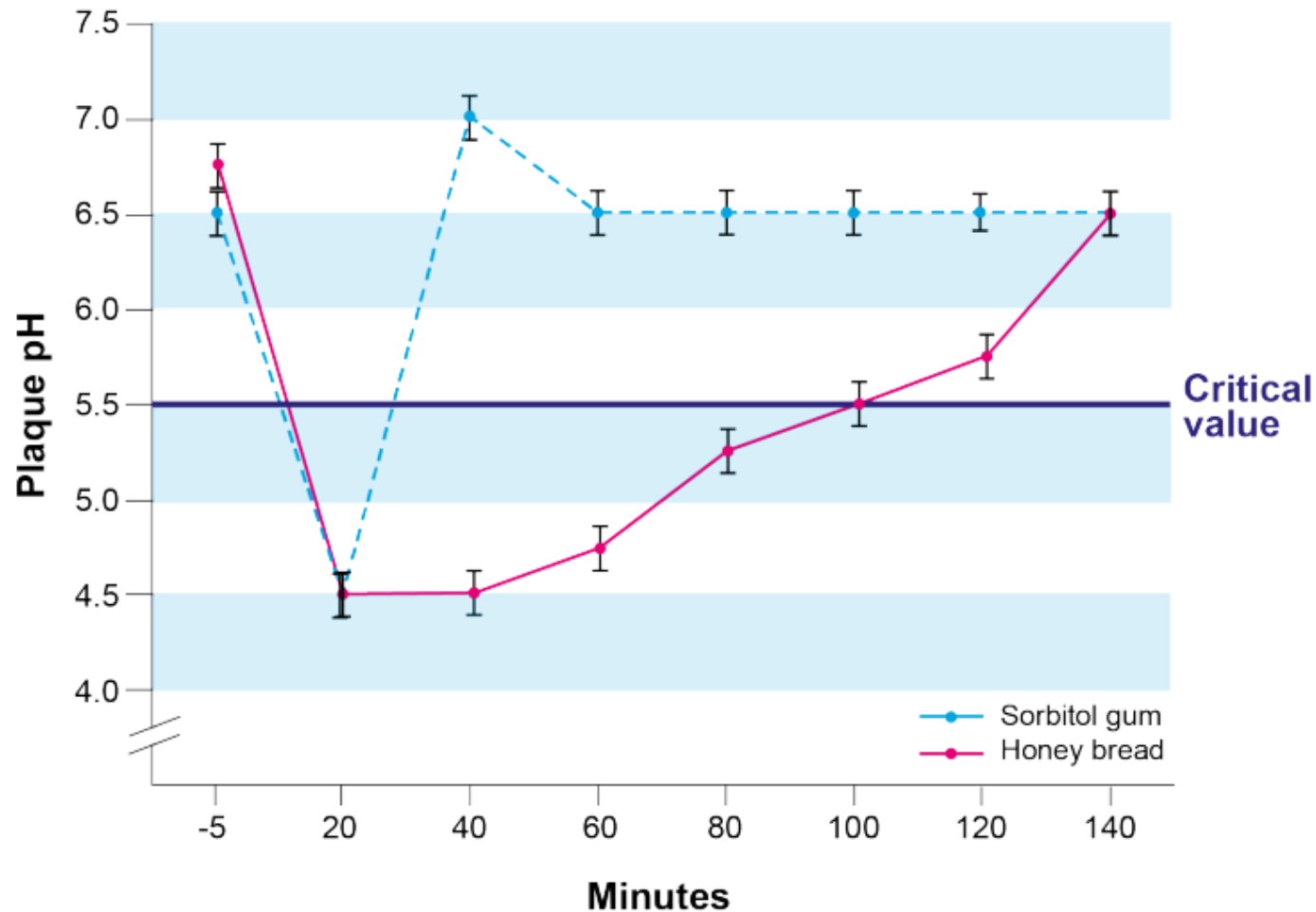
Baseline oral debris after eating cookie



Oral debris after chewing gum for 2 min



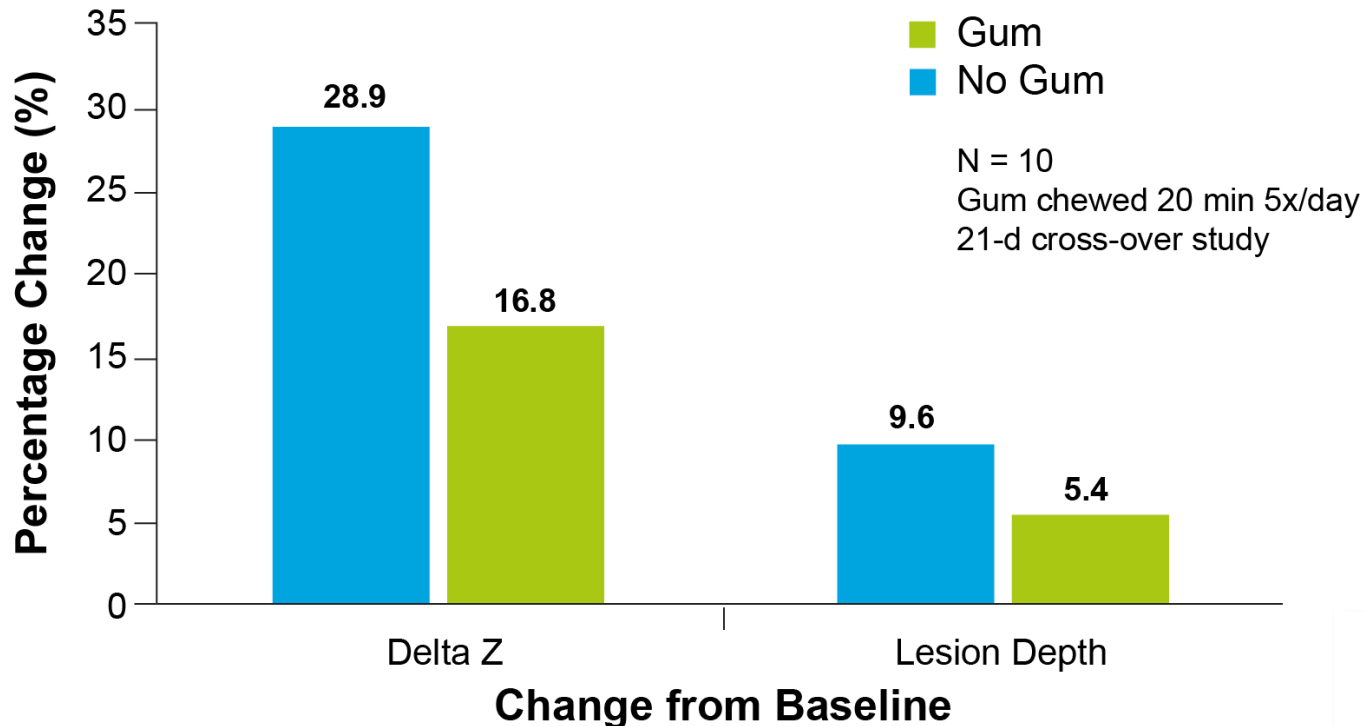
Chewing sugarfree gum neutralizes plaque acidity



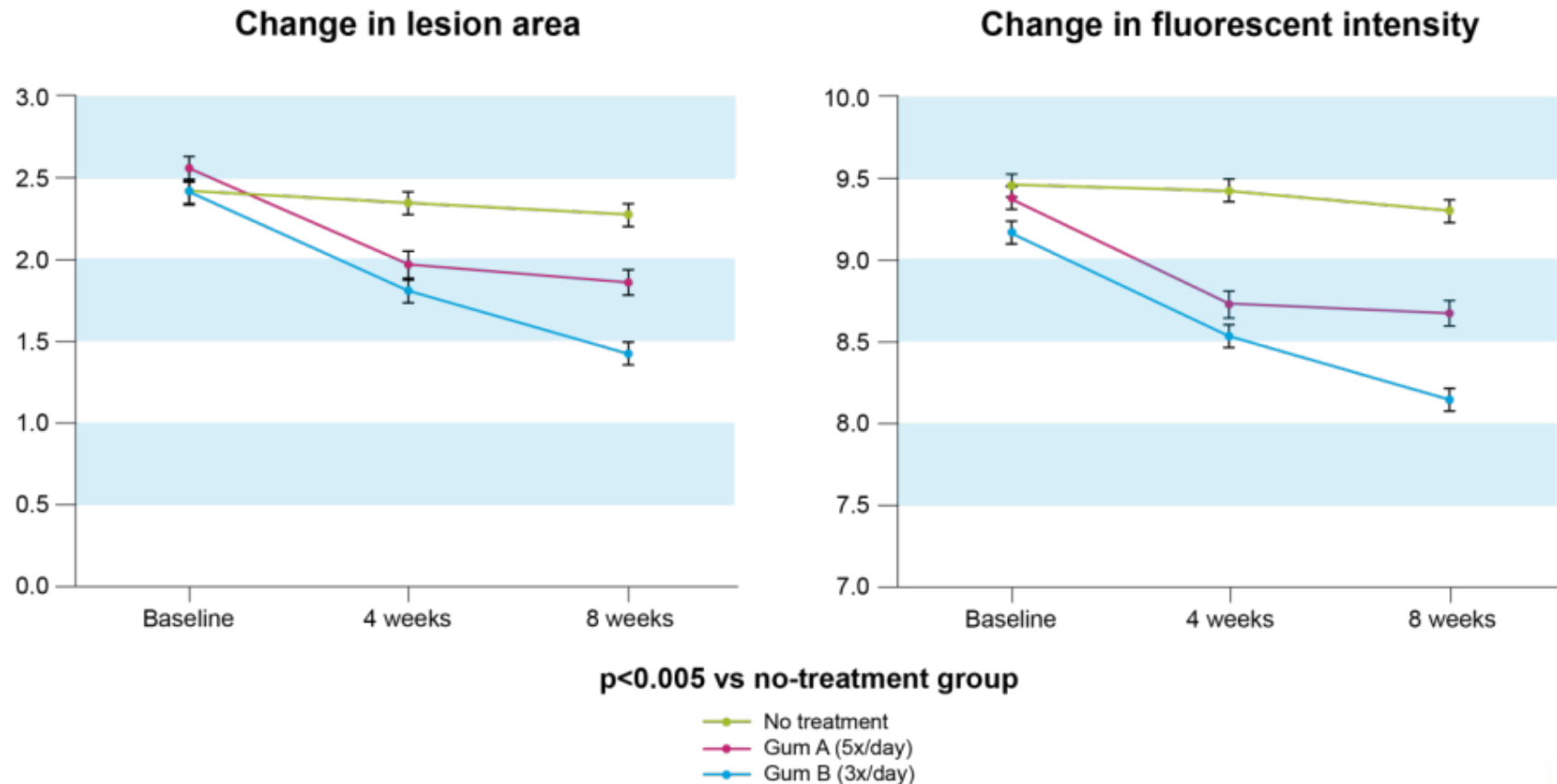
Graph adapted from: Fröhlich S, Maiwald HJ, Flowerdew G. Effect of gum chewing on the pH of dental plaque. *J Clin Dent.* 1992;3:75–8.

Stimulated saliva is effective for remineralizing damaged enamel

MINERAL CONTENT AND LESION DEPTH

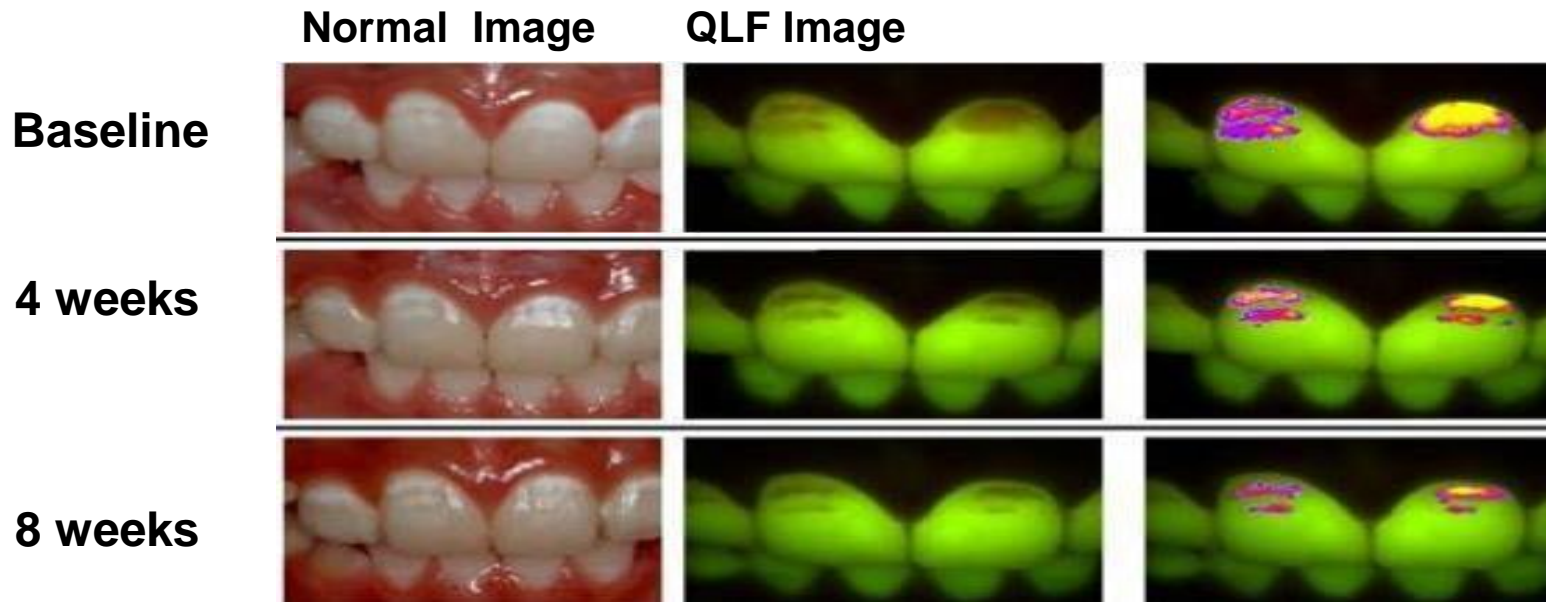


Stimulated saliva encourages the remineralization of early caries¹



1. Dong Y, *et al.* Remineralization of early caries by chewing sugar-free gum: a clinical study using quantitative light-induced fluorescence. *Am J Dent.* 2014;27:291-5.

Stimulated saliva encourages the remineralization of early caries¹



Studies demonstrate the caries-protective benefits of sugarfree gum



Hungary

Results show 38.7% reduction in DMFS increment after 2 years



Puerto Rico

7.9% fewer DMFS in all subjects and 11.0% fewer in high-caries subjects



1. Szöke J, *et al.* Effect of after-meal sucrose-free gum-chewing on clinical caries. *J Dent Res.* 2001;80:1725-9
2. Beiswanger BB, *et al.* The effect of chewing sugar-free gum after meals on clinical caries incidence. *JADA.* 1998;129:1623-6.

A wealth of clinical evidence supports the oral health benefits of sugarfree gum

Study	Intervention	Frequency	Control	Reduction of Caries Incidence
Möller 1973	Sorbitol gum	3x/day	No gum	10%
Isokangas 1988	Xylitol gum	3x/day	No gum	45%
Kandelman 1990	Xylitol gum (15% and 65%)	3x/day	No gum	61–66%
Mäkinen 1995	Sorbitol, xylitol or combinations gum pellets and sticks	5x/day	No gum	17–71%
Mäkinen 1996	Sorbitol, xylitol or combinations gum pellets and sticks	5x/day	No gum	28–69%
Beiswanger 1998	Sorbitol gum after meals High risk subjects, intention to treat	3x/day	No gum	12%
Alanen 2000	Xylitol gum	6x/day	No gum	54%
Szöke 2001	Sorbitol stick after meals Including white spots	3x/day	No gum	33%
Machiulskiene 2001	Sorbitol, xylitol, HIS gum	5x/day	No gum	25–33%
Peng 2004	Sorbitol, xylitol or carbamide gum	4x/day	No gum	42%

Median reduction of caries incidence: **52%**

Summarizing the benefits of sugarfree gum

Enhances production of saliva and its related oral health benefits:

- Cleaning mouth of food debris and sugars
- Neutralizing acids
- Supporting remineralization

All of which can help reduce the incidence of dental caries.



Recognition and endorsement of sugarfree gum

EC approved oral health claims for sugarfree gum

The European Commission (EC) has approved five oral health claims for sugarfree chewing gum, one of the few food categories to gain such recognition.



EUROPEAN
COMMISSION

The screenshot displays the 'EU Register on nutrition and health claims' website. The page title is 'HEALTH AND CONSUMERS Food'. The main heading is 'EU Register on nutrition and health claims'. Below this, there is a search bar and a table of approved claims. The table has four columns: 'Claim', 'Nutritional, substantiated, based on health category', 'Claims', and 'Conditions of use of the claim / Requirements for claim substantiation'. The table lists five approved claims for sugarfree chewing gum, each with its corresponding nutritional category, the claim itself, and the conditions of use and substantiation requirements.

Claim	Nutritional, substantiated, based on health category	Claims	Conditions of use of the claim / Requirements for claim substantiation
EU-12345	Sugar-free chewing gum	Sugar-free chewing gum contributes to the maintenance of oral cleanliness.	The claim may be used only for chewing gum which complies with the conditions of use for the nutrition claim category 'EU-12345' as listed in the Annex to Regulation (EC) No 1924/2006. Information shall be given to the consumer that the beneficial effect is obtained with chewing, for at least 20 minutes, after eating or drinking.
EU-12346	Sugar-free chewing gum	Sugar-free chewing gum contributes to the maintenance of dental health.	The claim may be used only for chewing gum which complies with the conditions of use for the nutrition claim category 'EU-12346' as listed in the Annex to Regulation (EC) No 1924/2006. Information shall be given to the consumer that the beneficial effect is obtained with chewing, for at least 20 minutes, after eating or drinking.
EU-12347	Sugar-free chewing gum	Sugar-free chewing gum contributes to the reduction of oral diseases.	The claim may be used only for chewing gum which complies with the conditions of use for the nutrition claim category 'EU-12347' as listed in the Annex to Regulation (EC) No 1924/2006. Information shall be given to the consumer that the beneficial effect is obtained with chewing, for at least 20 minutes, after eating or drinking.
EU-12348	Sugar-free chewing gum with xylitol	Sugar-free chewing gum with xylitol reduces plaque formation and is more effective than sugar-free chewing gum without xylitol.	The claim may be used only for chewing gum which complies with the conditions of use for the nutrition claim category 'EU-12348' as listed in the Annex to Regulation (EC) No 1924/2006. Information shall be given to the consumer that the beneficial effect is obtained with chewing, for at least 20 minutes, after eating or drinking.
EU-12349	Sugar-free chewing gum	Sugar-free chewing gum helps reduce plaque formation. Plaque is a bio-film in the development of dental caries.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.
EU-12350	Sugar-free chewing gum	Resistant to dental health with for health: promotes healthy teeth and gums, helps protect teeth and gums, reduces plaque and tartar.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.
EU-12351	Sugar-free chewing gum	Helps reduce the formation of plaque. Plaque is a bio-film in the development of dental caries. Helps to keep teeth and gums in optimal health conditions by inhibiting the formation of plaque.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.
EU-12352	Sugar-free chewing gum	Helps reduce the formation of plaque. Plaque is a bio-film in the development of dental caries. Helps to keep teeth and gums in optimal health conditions by inhibiting the formation of plaque.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.
EU-12353	Sugar-free chewing gum	Helps reduce the formation of plaque. Plaque is a bio-film in the development of dental caries. Helps to keep teeth and gums in optimal health conditions by inhibiting the formation of plaque.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.
EU-12354	Sugar-free chewing gum	Helps reduce the formation of plaque. Plaque is a bio-film in the development of dental caries. Helps to keep teeth and gums in optimal health conditions by inhibiting the formation of plaque.	Information shall be given to the consumer that the beneficial effect is obtained with chewing of 20 g of sugar-free chewing gum for 20 minutes, at least once, twice per day after meals.

Health Canada also approved oral health claims but went further with their advice

“Chewing sugarfree gum, three times per day after eating/meals, helps reduce/lower the risk of dental caries/tooth decay/cavities.”



Health
Canada



The benefits of sugarfree gum are also recognized by 20+ dental associations

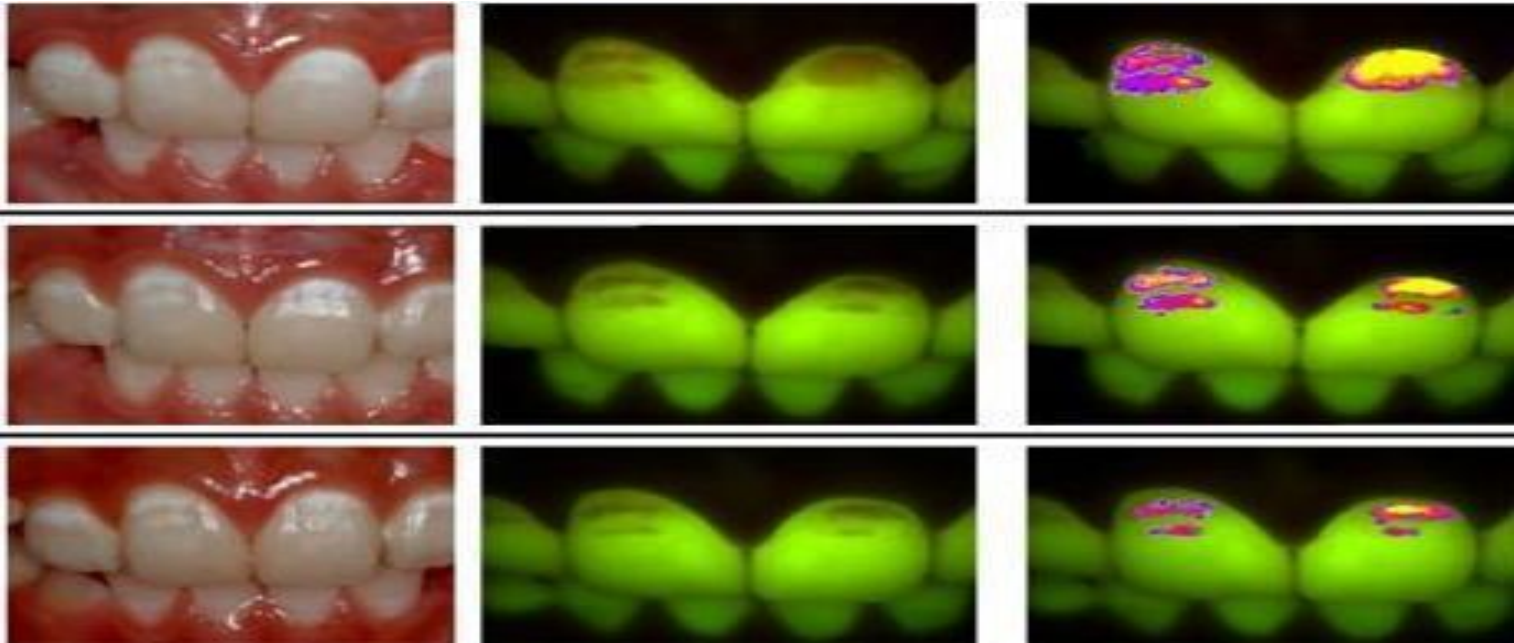
Sugarfree gum is endorsed by the World Dental Federation (FDI)

“Chewing sugarfree gum, like Extra, is proven to benefit dental health as it helps neutralize plaque acids.” — FDI

As well as 20+ national dental and dental health associations worldwide



Could this be your patient?



Thank you



Working for better oral healthcare
www.ExtraOralHealthcareProgram.com.au