

Addictive Substances



Addictive Substance?



Quit Sugar? Are you crazy!?

- Major issues with a large sugar diet:

- Heart failure
- Diabetes

Failed sugar substitutes*

- Aspartame
- Saccharin
- Splenda

- *These examples “failed sugar substitutes” have been found to be dangerous for human consumption, therefore not a safe alternative.



Xylitol



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Learning Objectives

- What is Xylitol?
- History of Xylitol
- Benefits of Xylitol
- How does Xylitol reduce dental cavities?
- How does Xylitol help remineralize tooth enamel?
- Is Xylitol safe?
- Recommended dosage of Xylitol

What is Xylitol?

- Sugar substitute
- 40% less calories than sucrose (table sugar)
- Commercially produced from **birch bark**, corn husks, straw, and sugar cane.
- Found naturally in fibers of:
 - berries & fruits
 - vegetables
 - oats

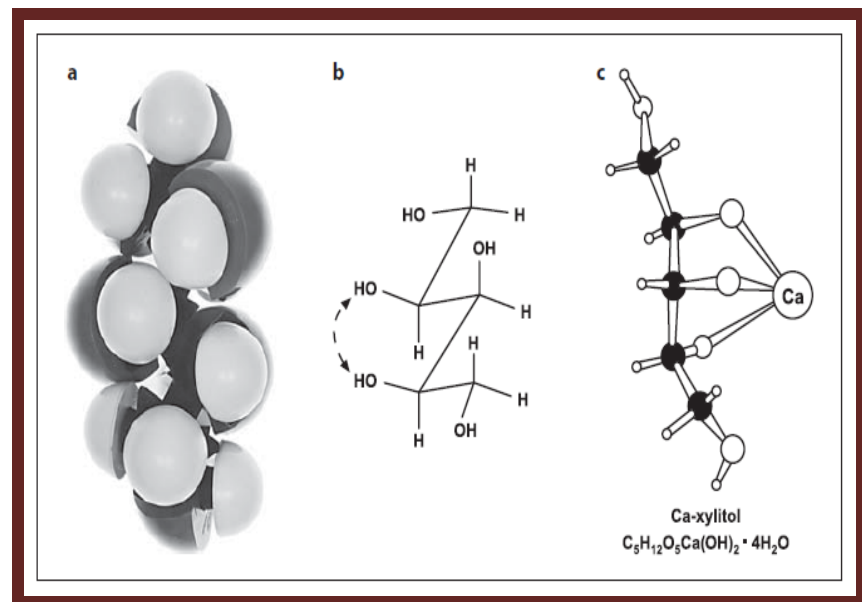
(Sreenivas Rao et al., 2006).



What is Xylitol? (cont'd)

- 5 Carbon sugar alcohol
- Tastes like sucrose (common table sugar) but only 2.4kcal/g calories
- The body produces ~ 15mg/day

(Makinen, 2010, p. 306).



History of Xylitol

- Discovered in 1890 by Fischer & Bertrand
- 1963 USFDA approves Xylitol
- 1960's incidents of dental cavities in Finland dropped dramatically when consuming Xylitol instead of sucrose.
- 1965 Turku Sugar Study

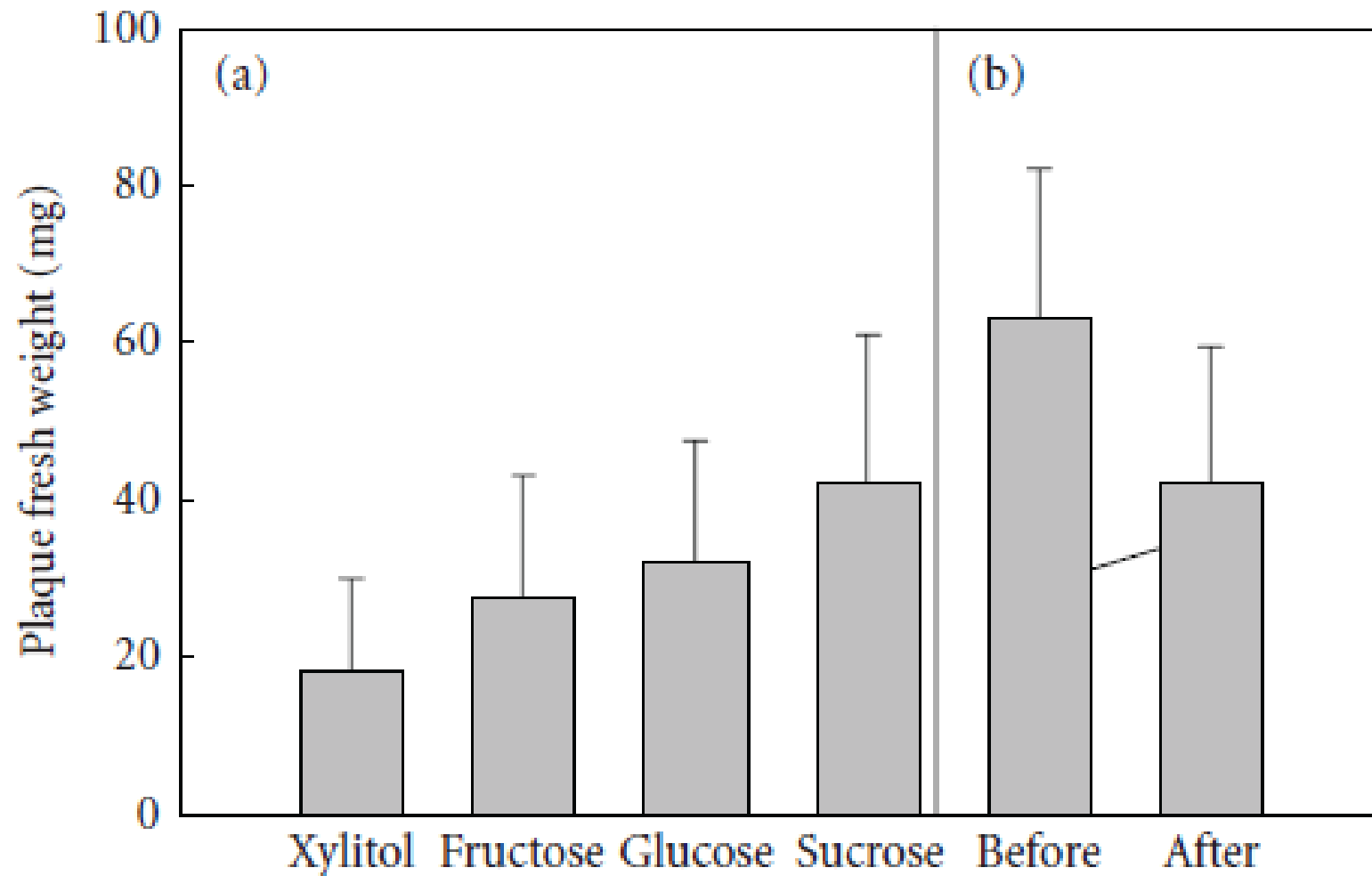
(Makinen, 2000, p. 1352).



Two-Year Turku Sugar Study, 1970s

Type of sugar sweetener	Number of Participants	Mean increment of decayed, missing and filled tooth surfaces
Sucrose only	35	7.2
Fructose only	38	3.8
Xylitol only	52	0.0
Discontinued participants	10	Not available

Stein, J. M. (2012). Xylitol to the rescue. *Access*, 22-23.



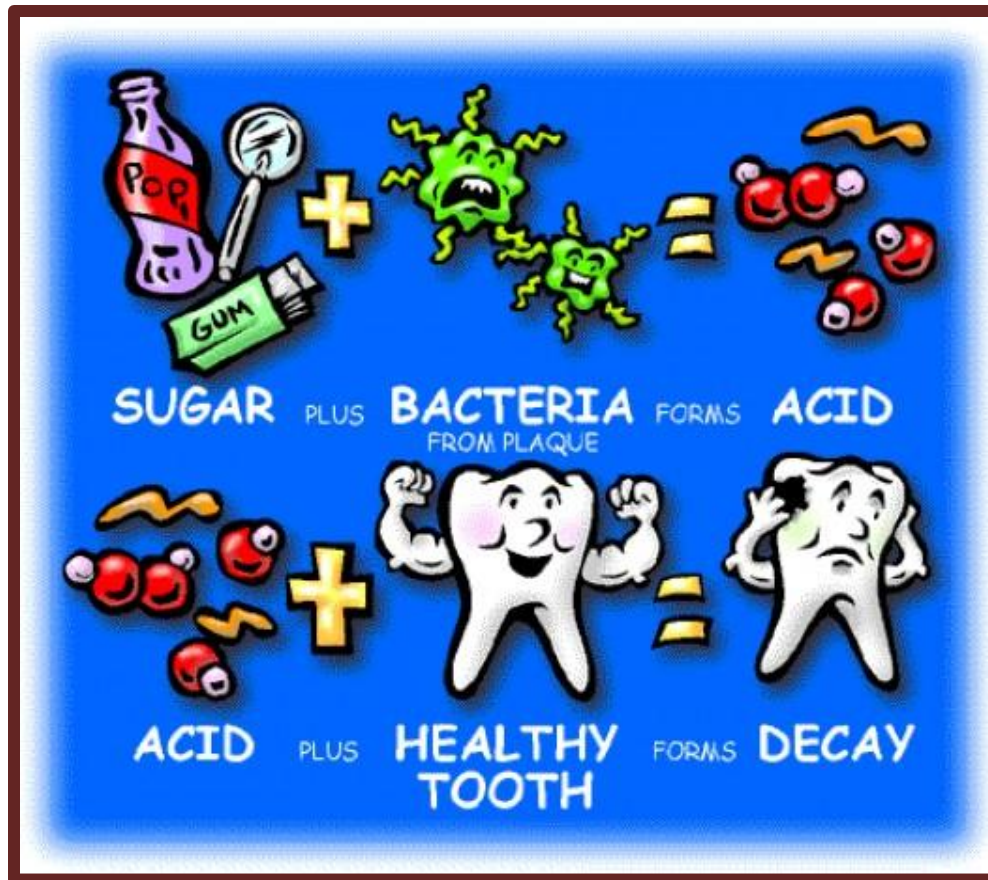
“How it all began”. (a) The pioneering plaque assessment study of 1970, showing the various effects on the growth of dental plaque over 4 days of consumption (while refraining from oral hygiene). Dosage ~20g/day spread through day. (b) one month xylitol test ~6.7g/day (Makinen, 2009, p. 2).

Mechanism of dental caries (cavities)

- Fermentable carbohydrates that produce lactic acid
- Susceptible tooth enamel
- Oral bacteria
 - i.e. *Streptococcus mutans* (gram-positive bacterium)



- Lactic acid → decreased pH levels
- Increased acidity in mouth & dental plaque
- = demineralization of tooth enamel & decay



Mechanisms of xylitol

- xylitol is a poor substrate for bacteria
- bacteria are not able to use xylitol for energy
- xylitol is less reactive
- xylitol decreases growth of *S. mutans*.

(Jones, 2010) (Makinen, 2010) (Makinen, 2009)



What's needed for enamel remineralization?



- 3 chemical conditions needed:
 - Sufficiently high pH
 - Sufficiently high calcium & phosphate levels
 - Sufficiently high peptides in saliva

Saliva – nothing to spit about



- Saliva acts as a reservoir for Ca^+ & PO_4 ions
- Needs alkaline pH levels

Saliva + Xylitol = remineralization

- xylitol in saliva stabilizes Ca^+ & PO_4 system
- Xylitol- Ca^+ binding complex very important
- Xylitol transports Ca^+ thru membrane pores

(Makinen, 2009, 2010) (Chen et al., 2010) Su et al., 2011)



Benefits of Xylitol

- Reduces incidents of dental cavities
- Reduces growth of dental plaque, & biofilm
- Interferes with oral bacteria
- Increases tooth enamel remineralization

(Makinen, 2009, 2010).



Research Results

Streptococcus Mutans

- Infants usually receives first cariogenic bacteria from their caregiver by ways of kissing and food tastings.
- A 6 year study in Finland showing significantly less signs of dental bacteria from when the mother and or infant use xylitol gum.

Acute Otitis media (middle ear infection)

- Children chewing xylitol gum for 3 months showed 30% decrease in middle ear infection

(Peldyak, & Makinen, 2002) (Uhari et al., 1996)

Research Results (cont'd)

Osteoporosis

- Xylitol-Calcium complex facilitates calcium absorption across the gut wall
- Aged rats had increased bone volume and bone mineral content after being fed xylitol

(Mattila et al., 2001, 2002) (Vasilescu et al., 2011, p. 127)

Research Results (cont)

2010 Makinen literature review-

40 medical and nutritional effects of xylitol include:

- alleviation of dry mouth (xerostomia)
- diabetic sweetener
- energy source in infusion therapy
- stimulation of pancreatic enzyme secretion
- preservation of red blood cells
- increase absorption of B vitamins & calcium.
- promote endogenous fat mobilization & oxidation

Athletes

- “an important effect of xylitol metabolism is the activation of the glutathione antioxidant system which helps to squelch free radicals generated by heavy exercise, thereby reducing oxidative damage”
 - (Vasilescu et al., 2011, p. 127).
- Sport nutrition products containing xylitol.



HEED SPORTS DRINK

HEED SPORTS DRINK - HIGH ENERGY ELECTROLYTE DRINK

NEW 16-SERVING CONTAINERS!

- Steady, consistent energy
- Buffer lactic acid
- Help prevent cramps
- Gluten-free and vegan friendly
- Contains no MSG
- Kosher Certified ([more info](#))
- Won best of MTBR award for 05, 06, 08, 09, and 2010 ([read article..](#))



RECOVERITE

GLUTAMINE-FORTIFIED RECOVERY DRINK

NEW 16-SERVING CONTAINERS!

- Minimize post-exercise muscle soreness
- Rebuild muscle tissue
- Restore muscle glycogen
- Made with natural ingredients
- Gluten-free
- Contains no MSG
- Kosher Dairy Certified ([more info](#))



Is Xylitol Safe?

- Approved by USFDA in 1963
- Has been shown to be safe for long term consumption
- Effects have been studied for many years
- Safe for nursing mothers
- One study found no harmful effects in a diabetic person who consumed 65g/day for a 2 yr period
- (Makinen, 2010, p. 310).

Is Xylitol Safe? (cont'd)

- Children can tolerate a lesser dosage. Found to be about 45g/day without any gastro- intestinal symptoms.
- Toxic to dogs (stimulates release of insulin leading to hypoglycemia, liver failure, seizures, or death).
- Toxic amounts have been reported to be 50mg/lb dog weight, or 0.050g xylitol/lb dog weight.

(Uhari, et al., 1996, p. 1182).

<http://www.vcahospitals.com/main/pet-health-information/article/animal-health/xylitol-toxicity-in-dogs/4340>.

Worldwide Endorsements

- National Dental Associations of 21 countries
- Ministry of Health of 3 countries
- Armed Forces of 2 countries
- USFDA
- EU Scientific Community
- WHO
- American Academy of Pediatric Dentistry
- Canadian Dental Association
- 35 countries have approved xylitol as sugar substitute
(Makinen, 2010) (Jones, 2010) (Ly et al., 2008)

Dosage

- Amount used in studies typically ranged from 4g-12g per day
- General recommended dosage 6g-12g/ day for dental health.



Summary

- Naturally found sugar alcohol
- Prevents cavities, remineralizes tooth enamel
- Popular sugar substitute used in some commercial products
- 50 + years of research support beneficial outcomes of xylitol consumption
- Very low glycemic index of 7 to 10, compared to sucrose at 60 to 65 glycemic index.
- Safe

Questions

- 1) **Xylitol has more calories than Sucrose (common table sugar)?** True / False
- 2) **Xylitol has still yet to be approved by the USFDA?** True / False
- 3) **Who can't safely consume xylitol?**
 - a) diabetics
 - b) nursing mothers
 - c) children
 - d) Boris
 - e) dogs
- 4) **What are the benefits of Xylitol:**
 - a) prevents cavities
 - b) reduces growth of plaque
 - c) interferes with oral bacteria growth
 - d) remineralizes tooth enamel
 - e) reduces otitis media in children (middle ear infection)
 - f) all of the above



Answers

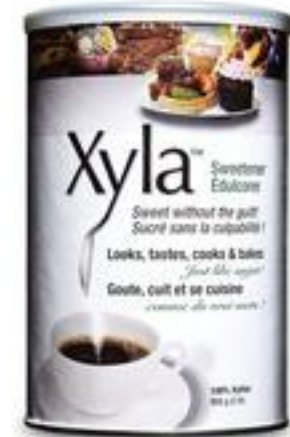
1) False

2) False

3) E) dogs

4) F) All of the above

xylitol products



Xylitol Nasal Spray

#XNS45 Xlear
Nasal Wash
1.5 fluid oz. (45ml), \$12.05



Xylitol Mouthwash

#XWMW16 XyliWhite
Mouthwash
Fresh Mint Flavor
16 fluid oz. \$6.49

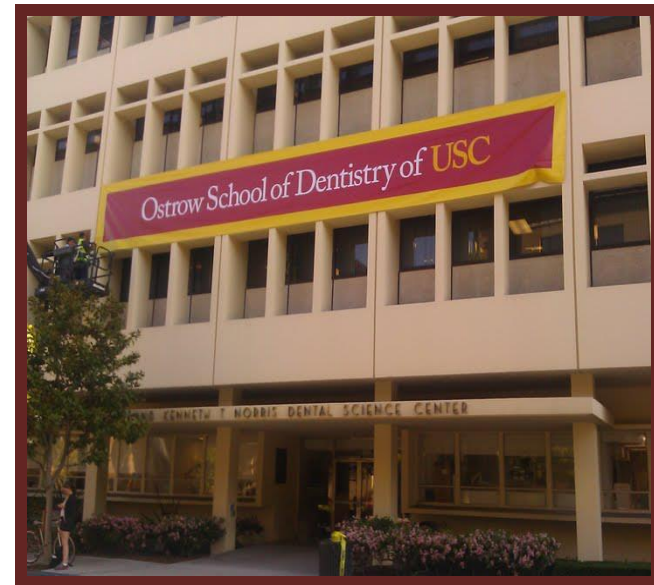


Xylitol Jam from Abbotsford BC

- organic
- local products
- Made in Canada
- local company, partly owned by Wanda's son Eric.



- Wanda heard of xylitol from her son Daryl.
- He learned about xylitol while in Dental School at USC.



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