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Dear Nutrition Professional:

Proper hydration is essential for good health. In fact, losing as little as 1 to 2% of body weight from fluids can impair physical performance and our ability to think.¹ While water is always a good option, your clients are probably asking you about alternatives that provide flavour and variety without adding too many calories to their diet.

Studies show that Canadians view low sugar content as the third most influential consideration when choosing a beverage.² Finding new ways to help your clients balance their desire for taste with lower calories and sugar can be a challenging task. Understanding the differences among the range of zero and low-calorie sweeteners can also be difficult.

The purpose of this mailing is to help you guide your clients in making informed choices about sweeteners. Enclosed is a brochure titled "How Sweet it is: The facts on zero and low-calorie sweeteners in Canada." We hope this will become a useful tool to review with your clients as it lays out background facts, safety information and labeling and regulatory requirements for the most common sweeteners used in Canada and in many PepsiCo Canada products.

Included in the brochure is information about stevia, a plant native to South America, which contains naturally sweet components in its leaves. Rebaudioside-A (Reb A) is an extract derived from the leaves of the stevia plant, which is 200-300 times sweeter than sugar, and has been approved by Health Canada for use in natural health products (NHPs).

As part of our commitment to nourish Canadians with a broad range of high quality food and beverage products, PepsiCo Canada is proud to be the first company to introduce beverages sweetened with all natural pure stevia extract (Reb A, PureVia™ all natural sweetener) in Canada. Both Aquafina Plus Vitamins 10 Cal™ vitamin enhanced water (available in Black & Blue Berry, Acai Fruit Punch and Tropical Cherimoya) and SoBe® Lo-Cal™ enhanced fruit flavoured beverage (available in Fuji Apple Cranberry and Raspberry Lemonade) are now available in stores across Canada.

As always, we welcome your comments and questions. Please direct all feedback and inquiries to pepsicohealthandwellness@pepsico.com. To access additional copies of "How Sweet it is: The facts on zero and low-calorie sweeteners in Canada" or any of our other health and wellness materials, please visit our new website at www.pepsiconutrition.ca.

Yours in good health,

Lori Kelly RD
PepsiCo Canada ULC
Director, PepsiCo Canada Health and Wellness

1. Liebermann HR. Hydration and Cognition: A Critical Review and Recommendations for Future Research. *J Am Coll Nutr* 2007;26:555S-61S.
2. Canadian Council of Food and Nutrition Tracking Nutrition Trends VII, 2008



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HOW SWEET IT IS:

The facts on zero and low-calorie sweeteners in Canada

Canadian consumers continue to be concerned with reducing the amount of sugar in their diet. Low sugar content is the third most influential consideration for Canadians when making food choices.¹ Zero and low-calorie sweeteners seem to offer the perfect solution: the sweetness of sugar with a lower calorie count. But what are the choices for Canadian consumers and which of the many options available is the right one for a particular individual?

The introduction of new products, new research findings and ever-changing regulations can pose a challenge for health professionals trying to help their clients make informed choices about sweeteners. Knowing the facts on the science, safety and current labeling requirements for zero and low-calorie sweeteners can make this task somewhat easier.

Broadly speaking, zero and low calorie sweeteners approved for use in Canada may fall into one of four categories: those used in foods, beverages and tabletop sweeteners; natural sweeteners used in natural health products; sweeteners classified as sugar alcohols; and sweeteners used in tabletop sweeteners but not in foods or beverages.

Zero calorie sweeteners used in foods, beverages and tabletop sweeteners

Background Facts^{2,3}

Acesulfame potassium (Ace-K), approved for use in Canada in 1988, is 200 times sweeter than sugar. Ace-K is not metabolized and is eliminated in the urine unchanged, meaning it is essentially a zero-calorie sweetener.

Aspartame, 180 times sweeter than sugar, has been available in Canada since 1981. Aspartame contains two amino acids – aspartic acid and the methyl ester of phenylalanine, both of which are found naturally in many foods, including meat, fruit and vegetables.⁴ Although amino acids provide four calories per gram, the amount of aspartame used as a sweetener is so small that it contributes a nutritionally insignificant amount of calories. Aspartame is therefore considered a non-nutritive sweetener. It is used in a wide variety of products that do not require heating.

Neotame^{5,6} is an ingredient 8,000 times sweeter than sugar that was introduced in 2007. Chemically related to aspartame, neotame is composed of the amino acids aspartic acid and phenylalanine. It is more heat stable than aspartame and is used in very small amounts because it is 30–60 times sweeter than aspartame.

Sucralose approved in 1992, is 600 times sweeter than table sugar. Sucralose is made from sugar by replacing three hydroxyl groups in sucrose with chlorine. The body does not recognize sucralose as carbohydrate, and it is neither digested nor metabolized. Sucralose is heat stable, which enables its use in baked goods in addition to a variety of other foods and beverages.

Safety

Cumulative evidence has shown that non-nutritive sweeteners are a safe and effective way to replace sugars in the diet.⁴ There is strong evidence that these sweeteners are safe for people, including those with diabetes, when consumed in amounts that fall within the acceptable daily intake (ADI) (See page 4).⁷ A typical diet with a moderate intake of common foods would not exceed the ADI. Studies have also shown that non-nutritive sweeteners do not affect blood glucose levels.⁸ Experts have found no adverse health effects with regard to the use of acesulfame potassium, aspartame, neotame or sucralose, with one minor exception: aspartame is contraindicated for people who suffer the rare genetic disorder known as phenylketonuria (PKU).

Additionally, in 2006, the European Food Safety Authority evaluated a long-term study on the carcinogenicity of aspartame and concluded that, based on the current data available, there is no reason to further review the safety of aspartame. Health Canada agreed with these findings and supports the safety of Aspartame.⁹

Labelling and Regulatory Requirements¹⁰

Ace-K, aspartame, neotame and sucralose are approved in Canada for use as food additives. The Canadian Food and Drug Regulations (Division 16, Table IX) prescribes their terms of use, including the types of foods to which they may be added and the maximum amount permitted. The label of a food or beverage that contains any of these sweeteners must mention the sweetener(s) on the front panel. The product must also have a Nutrition Facts Table and an Ingredient List where the named sweetener content is expressed in milligrams per serving. In the case of aspartame, a statement that aspartame contains phenylalanine is grouped together with the ingredient list.

When these substances are sold as tabletop sweeteners, a statement grouped with the ingredient list must state the sweetness per serving compared to the amount of sugar that would be needed for an equivalent degree of sweetness.

1. Canadian Council of Food and Nutrition Tracking Nutrition Trends VII, 2008. 2. Canadian Food and Drug Regulations Division 16 Table IX. 3. Réjeanne Gougeon et al Canadian Diabetes Association National Nutrition Committee Technical Review: Non-nutritive Intense Sweeteners in Diabetes Management, Canadian Journal of Diabetes; 28 (4):385-399, 2004; 4. Larson Duyff R. American Dietetic Association Complete Food and Nutrition Guide. John Wiley & Sons Inc. 2006. 5. Canada Gazette Part II Amending the Food and Drug Regulations (1433, Neotame) Vol. 141, No. 17 – August 22, 2007. 6. US FDA Federal Register: July 9, 2002 (Volume 67, Number 131) <http://vm.cfsan.fda.gov/~lrd/fr020709.html>. 7. M.J Franz; Diabetes Care January 2002 vol. 25 no. 1 148-198. 8. Shills, Modern Nutrition in Health and Disease 10th Edition, Lippincott, Williams & Wilkins, 2006. 9. Health Canada Comments on the Recent Study Relating to the Safety of Aspartame, May 2006. 10. Canadian Food Inspection Agency 2003 Guide to Food Labelling and Advertising. 11. International Food Information Council. Stevia Sweeteners: Another Low-Calorie Option. Food Insight, May, 2009. 12. Health Canada. Frequently Asked Questions “FAQs” on stevia. <http://www.hc-sc.gc.ca/fn-an/securit/addit/sweeten-edulcor/stevia-faq-eng.php>. 13. American Dietetic Association Website (www.eatright.org) Hot Topics: Stevia, June 2009. 14. Health Canada. <http://www.hc-sc.gc.ca/dhp-mps/prodnatur/legislation/docs/notice-avis-stevia-eng.php>. 15. US Food and Drug Administration (FDA) Agency Response Letter GRAS Notice No. GRN 000252, 2008. 16. Health Canada Natural Health Product Directorate (NHPD) Monthly Communiqué Vol. 2, Issue 1 September 2006. 17. Canadian Diabetes Association (www.diabetes.ca) Sugars and Sweeteners 2008. 18. Position of the American Dietetic Association: Use of Nutritive and Non-nutritive Sweeteners; The Journal of the American Dietetic Association, 104(2):255-27, 2004. 19. Tetzloff et al. Tolerance to Erythritol Ingestion in Humans. Regulatory Toxicology and Pharmacology, S286, 24(2), 1996.

Natural zero calorie sweeteners used in natural health products

Background Facts^{3,11}

Rebaudioside A (Reb-A, PureVia™ all natural sweetener) is a natural, purified extract derived from the leaves of the stevia plant. Native to South America, stevia leaves contain naturally sweet components that are 200-300 times sweeter than sugar. Stevia has been used for centuries to sweeten foods and can be used as a sweetener, herb and remedy. It has been used commercially as a sweetener in Asia for more than 30 years. Health Canada has approved stevia extracts for use in natural health products (NHPs) like vitamin-enhanced waters and herbal products.¹² Although not absorbed in the human small intestine, Reb-A is broken down by bacteria into steviol, which may be absorbed, metabolized by the liver and excreted in the urine. PepsiCo uses the PureVia™ trademark to identify our Reb-A ingredient.

Safety

Studies have shown Reb-A to be a safe sugar alternative for use in foods and beverages. Research in people with diabetes and those with hypertension has revealed no adverse affects.¹³ Stevia-based sweeteners are approved for use in many countries including the United States, Japan, Australia and Brazil. In Canada, Health Canada permits the use of stevia and its extracts as non-medicinal (sweetener) and medicinal ingredients in natural health products, based on a review of international regulation and the clinical evidence for safety and efficacy.¹⁴ In 2008, the World Health Organization's Joint Expert Committee on Food Additives completed a multi-year review of the available scientific data on high purity stevia compounds, concluding that they are safe for use as general-purpose sweeteners.¹³ In addition, the U.S. Food and Drug Administration (FDA) had no objection to expert panel conclusions that Reb-A is Generally Recognized as Safe (GRAS) for use as a general-purpose sweetener.¹⁵

Labelling and Regulatory Requirements¹⁶

Products containing Reb-A are regulated as natural health products, and Reb-A can be added as a non-medicinal sweetening agent. Natural health products have standard labelling requirements including the quantity of each medicinal ingredient, a list of non-medicinal ingredients and mention of recommended conditions of use such as purpose and dosage.

Sugar alcohols as low-calorie sweeteners

Background Facts

Sugar alcohols are less sweet than sugar and provide less energy. Sugar alcohols are neither sugars nor alcohols, and do not contain ethanol. They are naturally present in many foods such as berries, fruit and vegetables and are also commercially produced from sucrose, glucose and starch. In the body, sugar alcohols are incompletely absorbed and are fermented by colonic bacteria. For this reason, they contribute fewer calories than sugars. Sugar alcohols are useful sugar substitutes for people with diabetes because they produce a lower glycemic response compared to sugar.⁸

Energy Values - Sugar Alcohols

Energy Source	Energy Values (Cal/g)*
Isomalt	2
Lactitol	2
Maltitol	3.0
Mannitol	1.6
Sorbitol	2.6
Xylitol	3.0
Erythritol	0.2

* Values from the Bureau of Nutritional Sciences, Health Products and Food Branch, Health Canada.

Safety

The use of sugar alcohols as sweetening agents is safe. It is important to note that because they are not fully absorbed, excessive intake of sugar alcohols may cause abdominal cramps and diarrhea, especially in children. Intakes above 10 grams per day may produce a laxative effect.¹⁷

Labelling and Regulatory Requirements¹⁰

Specific sugar alcohols are approved for use as food additives: lactitol, maltitol, mannitol, sorbitol, xylitol, erythritol and isomalt. When a product contains a sugar alcohol, the sugar alcohol must be stated in the ingredients list and must also be mentioned on the Nutrition Facts Table under carbohydrates.

Zero calorie sweeteners used in tabletop sweeteners, but not in foods or beverages

Background Facts³

Saccharin is 300-500 times sweeter than sugar. Discovered in 1897, it was one of the first high-intensity sweeteners. Saccharine is not broken down by the body and is excreted in the urine unchanged.

Cyclamate is 30-50 times sweeter than sugar. Studies raised concerns that cyclamate could be toxic to some people who could metabolize cyclamate to cyclohexylanine. As a result, it is not permitted as a food ingredient, but is available as a common tabletop sweetener, and should be used only under the advice of a physician.

Zero and Low-calorie Sweeteners found in PepsiCo Canada Beverages^{3,4,18}

Acesulfame-Potassium or Ace-K

200 times sweeter than sucrose • ADI* 15 mg/kg body weight



32 mg/355 mL



35 mg/355 mL

48 mg/355 mL

26 mg/335 mL



51 mg/473 mL



11 mg/250 mL



20 mg/355 mL

Aspartame

180 times sweeter than sucrose • ADI* 40 mg/kg body weight



124 mg/355 mL



64 mg/335 mL



41 mg/355 mL

Sucralose

600 times sweeter than sucrose • ADI* 9 mg/kg body weight



281 mg/473 mL



44 mg/355 mL



22 mg/250 mL



27 mg/250 mL

Sugar alcohol - Erythritol

3/4 less sweet than sucrose

NO ADI - Well tolerated at daily dose of 1.0 g/kg body weight¹⁹
The body does not absorb erythritol the way it absorbs sugar, that is why they contribute fewer calories



Erythritol 15 g/ 591 mL



Erythritol 17 g/591 mL

Reb-A

200 times sweeter than sucrose

ADI 12 mg/kg body weight¹⁵



124 mg/591 mL



172 mg/591 mL

* ADI = Acceptable Daily Intake is established by Health Canada based on extensive scientific evidence. ADI indicates the amount of a food additive that can be safely consumed on a daily basis over a person's lifetime without risk.



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