International Sweeteners Association

ISA Conference 2018

The science behind low calorie sweeteners: where evidence meets policy

London, UK, 6th November 2018
Royal Society of Medicine,
1 Wimpole street, W1G 0AE, London, UK

Agenda

9.10	Welcome and Introduction
9.30	Keynote speech - Low calorie sweeteners in the current public health discussion
10.00	Session 1 - Setting the scene: An introduction to low calorie sweeteners
11.50	Session 2 - Does evidence support a role for low calorie sweeteners in weight management?
14.10	Session 3 - Low calorie sweeteners and glucose control: can they aid in diabetes management?
16.00	Panel discussion session - Sugar reduction and low calorie sweetener use from a public health perspective
17.00	Closing remarks

Join the conversation about the ISA Conference on social media by using #ISAconf2018

Chairmans's Welcome

Mr Robert Peterson
Chair of the International Sweeteners Association (ISA) Board

Welcome to the ISA Conference 2018!

We are delighted to welcome you all to the third ISA scientific conference entitled "The science behind low calorie sweeteners: where evidence meets policy".

Since the beginning of its activities, over 35 years ago, the International Sweeteners Association has worked with a clear mission in mind: inform and educate on the most up-to-date nutritional and scientific information in relation to the role and benefits of low calorie sweeteners in the diet. The ISA encourages research into and enhances understanding of the role that low calorie sweeteners can play in achieving a balanced diet.

Since we last gathered for the ISA Conference in 2014, a wealth of new scientific research has been conducted and published around low calorie sweeteners' use, benefits and role in the diet, providing further evidence and creating the need for a fresh discussion around this topic. Moreover, new recommendations and nutrition policies regarding sugar reduction have been developed in Europe and around the world, shaping a new debate on public health.

The global burden of non-communicable diseases is overwhelming and compels action. World-wide efforts to control and prevent NCDs focus on reducing their risk factors, including by creating healthier food environments. Low calorie sweeteners are part of this process as they are used in reformulated foods and drinks which contain less sugar and fewer calories. In recognition of this wider debate, led by the public health institutions, we decided to focus our conference this year on a scientific programme looking at the evidence available to policy makers.

We are glad to have here today 17 internationally well-renowned speakers with multidisciplinary background who will lead the conversation during the three sessions and the final panel discussion. These experts have contributed extensively, with their research, to the current scientific knowledge about low calorie sweeteners and to the global scientific literature in relation to this subject. They are, therefore, the ideal guidance to lead you through the conversation we will have today around the use, safety and benefits of low calorie sweeteners.

We hope you will enjoy the conference, and use this as an opportunity to enhance the dialogue with all stakeholders and to advance the debate on this very topical subject that is strategically important for us here today and for the public health in general.

Thank you very much!

Robert Peterson
Chairman, International Sweeteners Association

Scientific programme

8.30 – 9.10	Registration, tea and coffee	
9.10	Welcome and Introduction	Robert Peterson (ISA)
9.20	Love, hate and confusion: sweeteners in the media	Stefan Gates (Moderator)

Keynote speech

Chair: Prof Alison Gallagher (UK)

9.30	Keynote speech: Low calorie sweeteners in the current public health discussion	Prof Adam Drewnowski (USA)

10.00 – 11.25 Session 1 – Setting the scene: An introduction to low calorie sweeteners

Chair: Prof Carlo La Vecchia (Italy)

10.00	Regulation and approval of low calorie sweeteners by international authorities	Dr Rebeca López-García (Mexico)
10.25	Evaluating research by understanding the metabolic fate of different low calorie sweeteners	Dr Berna Magnuson (Canada)
10.50	Low calorie sweeteners' use: a review of recent dietary intake assessment data	Dr Séverine Goscinny (Belgium)
11.15	Q&As	

11.25 – 11.50 Tea and coffee break

11.50-13.20 Session 2 - Does evidence support a role for low calorie sweeteners in weight management?

Chair: Dr France Bellisle (France)

11.50	Sweet taste, appetite and obesity: Is there a link?	Prof Kees de Graaf (Netherlands)
12.15	Latest evidence on low calorie sweeteners' role in weight management in children and adults	Dr John Sievenpiper (Canada)
12.40	How does consumer perception about low calorie sweeteners affect food behaviour and energy intake?	Dr Charlotte Hardman (UK)
13.05	Q&As	

13.20-14.10 Lunch break

14.10 – 15.40	**Session 3** **Low calorie sweeteners and glucose control: can they aid in diabetes management?**	
Chairs: Dr Marc Fantino (France); Prof Wendy Russell (UK)		
14.10	Do low calorie sweeteners affect glycaemic control and insulin sensitivity?	Dr Hugo Laviada-Molina (Mexico)
14.35	Low calorie sweeteners and gut microbiota: Why is there a debate?	Prof Ian Rowland (UK)
15.00	Low calorie sweeteners' role in the dietary recommendations for people with diabetes	Dr Duane Mellor (UK)
15.25	Q&As	

15.40 – 16.00 Coffee break

16.00 – 17.00	**Panel discussion session** **Sugar reduction and low calorie sweetener use from a public health perspective**	
Chair: Prof Peter Rogers (UK)		
16.00	The use of low calorie sweeteners in sugar reduction: challenges and opportunities	Prof Judith Buttriss (UK)
16.20	Panel discussion speakers: Prof Judith Buttriss; Prof Adam Drewnowski; Prof Alison Gallagher; Prof Carlo La Vecchia; Dr France Bellisle; Dr Marc Fantino; Prof Wendy Russell	

17.00 – 17.15 Closing remarks

Mr Robert Peterson, Chairman of the ISA Board

Biography

Bob graduated with a degree in Microbiology from Indiana University in 1972 and started working for the Food and Drug Administration in Chicago. In 1986 he joined The NutraSweet Company and continued as Director of Regulatory Affairs through the Monsanto/Pharmacia and Pfizer mergers, after which he joined Merisant. In 2004 he joined Tate & Lyle as VP of Regulatory Affairs.

He has been active in the International Sweeteners Association (ISA) since joining Tate & Lyle and has held various leadership positions and committee chairs. He is currently ISA Chairman.

Mr Stefan Gates, UK (moderator)

Biography

Stefan Gates is a hugely popular writer and TV presenter with a vast breadth of knowledge and a confident, sparky presenting style. He's renowned for his love of quirky culinary quests and extraordinary food adventures.

Stefan Gates has written and presented 18 TV series including food science series Harvest (BBC2), Food Factory (BBC1) and E Numbers: An Edible Adventure (BBC2), and three series of Cooking in the Danger Zone (BBC2) about global hunger and the politics of food. His programmes are shown in over 50 countries around the world. He also makes the acclaimed kids' series Incredible Edibles and Gastronuts (CBBC). He appears as a guest on dozens of others from Newsnight to Blue Peter. He has recently finished two BBC4 documentaries: Can Eating Insects Save the World? and Calves Heads and Coffee: the Golden Age of English Food. He has won several awards for his TV series and books. Stefan gives numerous talks at Science Festivals, and has been guest director of Cheltenham Science Festival. He has written eight books, performed more than 1000 live shows and is in production on a new Channel 5's series. His latest book, Insects: An Edible Field Guide, published in June 2017, explores the origins of insect eating, tips on finding edible bugs as well as providing some ideas for how to eat them once tracked down!

Keynote speech:
Low calorie sweeteners in the current public health discussion

Prof Alison Gallagher, Ulster University, UK (chair)

Biography

Alison Gallagher is Professor of Public Health Nutrition at Ulster University where she contributes to the research conducted within the Nutrition Innovation Centre for Food and Health (NICHE). Her research interests resonate within the area of obesity and include low calorie sweeteners and their potential impact on health, development of risk factors for disease and lifestyle interventions at key stages across the lifecycle particularly to enhance physical activity and health. A Registered Nutritionist (Public Health), she was the first Fellow of the Association for Nutrition (FAfN) on the island of Ireland. An active member of the Nutrition Society, she currently co-Chairs the Science Committee for the next FENS European Nutrition Conference (www.fens2019.org). She is a passionate advocate for the European Nutrition Leadership Platform (ENLP), having participated in the ENLP seminar in 1997 and being involved with this international leadership programme ever since, now as Chair/President of the ENLP Board (www.enlp.eu.com).

Prof Adam Drewnowski, University of Washington, Seattle, USA

Biography

Prof. Dr. Adam Drewnowski is the Director of the Center for Public Health Nutrition and of the Nutritional Sciences Program at the University of Washington in Seattle. He obtained his MA degree in biochemistry at Balliol College, Oxford University and PhD degree in psychology at The Rockefeller University in New York. His Nutrient Rich Food Index (NRF), a measure of nutrient density, helps to identify foods that are healthy, affordable, sustainable, and appealing. His work on nutrient profiling has helped food industry to reformulate product portfolios for better alignment with national and global guidelines. His research on food and beverage consumption patterns in relation to body weight and health outcomes has focused on food prices, diet disparities, and health equity issues. Prof. Drewnowski is the author of over 300 research publications. He advises governments, foundations, NGOs, and the private sector on geopolitical strategies related to diets and health.

Abstract

Title: Keynote speech: Low calorie sweeteners in the current public health discussion

Consumers use low calorie sweeteners (LCS) to reduce dietary sugar calories and manage body weight. Their efficacy has been confirmed repeatedly both in short-term laboratory studies, observational studies, and in longer-term randomized and placebo controlled clinical trials (RCT). Laboratory studies have consistently shown that LCS beverages do not enhance appetite, suppress satiety, or lead to overeating at the next meal or the next day. Rather LCS beverages promote a feeling of fullness in the short term. Observational studies of populations have shown that LCS use was associated with higher education and incomes and, importantly, with the intent to lose weight during the preceding 12 months. Any association with obesity or diabetes was most likely due to reverse causality. Users of LCS beverages, tabletop sweeteners and foods had higher-quality diets, engaged in more health behaviors, and lived in more affluent neighborhoods. Whereas earlier RCTs used to compare LCS beverages to regular sugar-sweetened beverages (SSB), the latest RCTs have compared LCS beverages to plain drinking water. Acute and long-term consumption of LCS beverages, compared to water, did not alter appetite, energy intakes, or macronutrient selection at multiple meals in a recent French study. Given the importance of adequate hydration and the established links between short term manipulations of hunger and satiety and the management of body weight in the long term, LCS beverages can be viewed as a useful tool for managing issues of public health concern, notably obesity and overweight.

References:

1. Drewnowski A, Rehm CD. The use of low-calorie sweeteners is associated with self-reported prior intent to lose weight in a representative sample of US adults. Nutr Diabetes. 2016 Mar 7;6:e202. doi: 10.1038/nutd.2016.9.
2. Fantino M, Fantino A, Matray M, Mistretta F. Beverages containing low energy sweeteners do not differ from water in their effects on appetite, energy intake and food choices in healthy, non-obese French adults. Appetite. 2018 Jun 1;125:557-565. doi: 10.1016/j.appet.2018.03.007. Epub 2018 Mar 9.
3. Bellisle F. Intense Sweeteners, Appetite for the Sweet Taste, and Relationship to Weight Management. Curr Obes Rep. 2015 Mar;4(1):106-10. doi: 10.1007/s13679-014-0133-8.

Session 1 - Setting the scene: An introduction to low calorie sweeteners

Prof Carlo La Vecchia, University of Milan, Italy (chair)

Biography

Dr. La Vecchia received his medical degree from the University of Milan and a master of science degree in Medicine (epidemiology) from Oxford University. Presently, he is Professor of Medical Statistics and Epidemiology at the Faculty of Medicine at the University of Milan. Dr. La Vecchia serves as an editor for numerous clinical and epidemiologic journals. He is among the most renowned and productive epidemiologists in the field with over 2050 peer-reviewed papers in the literature and is among the most highly cited medical researchers in the world, according to ISI HighlyCited.com, the developer and publisher of the Science Citation Index (2003, 2017, H index 154, H10 index 1571, second Italian in Clinical Medicine). Dr. La Vecchia is an Adjunct Professor of Medicine at Vanderbilt Medical Centre and the Vanderbilt-Ingram Cancer Centre (2002-18).

Dr Rebeca López-García, Logre International Food Science Consulting, Mexico

Biography

Dr Rebeca López-García has been an independent consultant in the areas of food safety, toxicology, regulations and crisis management for almost 20 years. She has worked with organizations such as the United States Agency for International Development (USAID), the United Nations Food and Agriculture Organization (FAO); universities such as the University of Arizona, Michigan State University, New Mexico State University and Universidad La Salle; and companies around the world. Rebeca is a guest lecturer on Latin American Food Regulations for Michigan State University since 2002. Dr. López-García belongs to the scientific advisory board of food and beverage companies. She has been instrumental in the regulatory approval of several food additives and novel ingredients in Latin American countries. In 1998, she received a Ph.D. in Food Science and Toxicology from Louisiana State University.

Abstract

Title: Regulation and approval of low calorie sweeteners by international authorities

Low-caloric sweeteners (LCS) are legally considered food additives by international authorities. According to the Codex Alimentarius, "a food additive is any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food, whether or not it has nutritive value, the intentional addition of which to food for a technological purpose in the manufacture, processing, preparation, treatment, packing packaging, transport or holding of such food results, or may be reasonably expected to result, in it or its by-products becoming a component of or otherwise affecting the characteristics of such foods." Since food additives such as LCS are added intentionally to foods, their safety must be carefully studied before introduction to the food supply. As opposed to drugs, foods can be consumed by any family member at any given time throughout a lifetime. Therefore, clear understanding of the metabolic fate of each compound and its potential physiological effects is needed to consider a specific compound for approval. Risk assessment of substances to be added to food must consider the safety throughout a lifetime of exposure. The safety of these compounds is studied through internationally recognized methods to answer specific questions and to show that under the intended conditions of use, these compounds can be safely added to foods. At the national level, each country may have their own approval processes and requisites, but the scientific basis of risk assessment and approval has a lot in common. This presentation will cover the basic process that ensures the safety of LCS prior to market introduction.

References:

1. Joint FAO/WHO Expert Committee of Food Additives (JECFA). Toxicological Evaluation of Certain Food Additives with a Review of General Principles and Specifications. Geneva.
2. International Programme on Chemical Safety (IPCHS). Principles for the safety assessment of food additives and contaminants in food. [Online]. Available from: http://www.inchem.org/documents/ehc/ehc/ehc70.htm#PartNumber:2.
3. Pressman P., Clemens R., Hayes W. and Reddy C. Food additive safety: A review of toxicologic and regulatory issues. Toxicology Research and Application (I) 2017: 1-22

Dr Berna Magnuson, Health Science Consultants Inc., Mississauga, ON Canada

Biography

Berna Magnuson is Vice President of Health Science Consultants, Inc. in Mississauga, Canada. Dr. Magnuson obtained a BSc (Honors) in Foods and Nutrition and worked in the food industry in quality assurance and product development. She then completed a MSc in Toxicology, a PhD in Nutritional Sciences, and postdoctoral research in pathology and biochemistry of colon cancer in Canada. Dr. Magnuson was a university professor for over 15 years in the US, conducting research in diet and colon cancer, and teaching food, nutrition and toxicology courses. Dr. Magnuson now works as a consultant providing expertise in food regulations, nutrition and toxicology to food, beverage, and dietary supplement manufacturers and ingredient industries, as well as health professional and consumer associations. Dr. Magnuson has extensive expertise in ingredient safety, including low calorie sweeteners, and serves as an expert advisor and speaker globally. In additional to confidential client reports and regulatory submissions, she has published over 70 peer-reviewed articles, book chapters, and professional articles. Dr. Magnuson is also a Fellow of the Academy of Toxicological Sciences (ATS).

Abstract

Title: Evaluating research by understanding the metabolic fate of different sweeteners

With continued efforts to find solutions to rising rates of obesity and diabetes, there is increased interest in the potential benefits of the use of low- and no calorie sweeteners (LNCSs) as a replacement for added sugars. Concerns about safety often deter the use of LNCSs as a tool in helping control caloric intake, even though the safety of LNCS use has been affirmed by regulatory agencies worldwide. In many cases, an understanding of the biological fate of the different LNSCs can help health professionals to address safety concerns and better interpret research study findings. This presentation will discuss the similarities and differences in the chemistry, regulatory status, and biological fate (including absorption, body distribution, metabolism, and excretion) of the commonly used LNCSs: acesulfame potassium, aspartame, cyclamate, saccharin, stevia leaf extract (steviol glycoside), and sucralose. Understanding the biological fate of the different LNCSs is critical to assess whether reports of biological effects in animal studies or in humans are truly indicative of possible safety concerns. Illustrations will include use of biological fate data to determine actual systemic exposure to LNCS; to assess appropriateness and/or flaws of various research study designs; and the safety of use of sweetener combinations. Thus greater awareness of the extensive data on biological fate of sweeteners is needed, as when utilized to critically evaluate research studies, can lead to increased confidence in the safety of use of LNCS.

References:

1. Magnuson BA, Carakostas MC, Moore NH, Poulos SP, Renwick AG. Biological fate of low-calorie sweeteners. Nutr Rev. 2016 Nov;74(11):670-689.
2. Renwick AG, Thompson JP, O'Shaughnessy M, Walter EJ. The metabolism of cyclamate to cyclohexylamine in humans during long-term administration. Toxicol Appl Pharmacol. 2004 May 1;196(3):367-80. PubMed PMID: 15094307.
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Dr Séverine Goscinny, Sciensano, Belgium (former Scientific Institute of Public Health (WIV-ISP), Belgium)

Biography

Séverine Goscinny specialized in Food sciences and technology at The Catholic University of Louvain (UCL) after graduating in agricultural engineering from the Free University of Brussels (ULB). A keen interest in analytical chemistry has driven her career towards research and method development in the field of contaminants (biogenic amines, dioxins, PCBs and HBCD, degradation products), pesticides, and food additives. Most of her activities at Sciensano are focused on dietary exposure assessments to support regulatory guidelines.

Abstract

Title: Low calorie sweeteners' use: a review of recent dietary intake assessment data

Obesity has increased significantly worldwide in the past decade with tangible consequences on public health such as diabetes, cardiovascular diseases and asthma. One approach to help people suffering from diabetes and obesity is to lower the amount of refined sugars consumed and sweeteners have received much attention as they provide no or little calories. Although their use as additives is strictly regulated, the need to evaluate the exposure to these compounds is a continuous process because eating habits and market availability of the products have changed since the first safety evaluation of these food additives. In this environment, dietary exposure assessment identifies possible exposure concerns and pin point specific subpopulations at risks. It is a powerful tool for setting health priorities, guide future diet guidelines, and to re-evaluate acceptable daily intake (ADI) parameters or maximum permitted levels in food. The research conducted provides a refined and up-to-date exposure estimates, high consumers and the most significant food contributors were identified. The talk will show how exposure assessment protocols can be refined step-by-step as to deliver the most accurate estimate of intense sweeteners intake. The established methodology was applied for the Italian and Irish population. The estimated exposure among consumers of low calorie sweeteners in Italy and Ireland was well below the ADIs. For both populations, drinks and table-top sweeteners were the main contributors to the exposure.

References:

1. Obesity update, June 2014, OCDE. Available at: http://www.oecd.org/health/Obesity- Update-2014.pdf
2. Le Donne CL., Mistura L., Goscinny S., et al. Assessment of dietary intake of 10 intense sweeteners by the Italian population. Food Chem Toxicol 2017; 102: 186-197
3. Buffini M., Goscinny S., Van Loco J., et al. Dietary intakes of six intense sweeteners by Irish adults. Food Addit Contam Part A Chem Anal Control Expo Risk Assess. 2018; 35(3): 425-438

Session 2 - Does evidence support a role for low calorie sweeteners in weight management?

Dr France Bellisle, Nutri Psy Consult, France (chair)

Biography

Following her Bachelor Degree (McGill University, Montreal) and a Masters Degree (Concordia University, Montreal) in experimental psychology, France Bellisle worked at the College de France in Paris in the laboratory of Jacques Le Magnen. She obtained Doctorate Degrees from the University of Paris. From 1982 until 2010, in the context of French National Research Institutes (CNRS, INRA), she developed original research in the field of human ingestive behaviours. Her research interests cover all types of determinants of food and fluid intake in human consumers, including psychological, sensory and metabolic factors as well as environmental influences. She has published over 250 articles in peer reviewed journals and contributed chapters to several books. She is now an independent consultant for scientific projects in the field of human appetite.

Prof Kees de Graaf, Wageningen University, Netherlands

Biography

Kees (C) de Graaf is a Professor in Sensory Science and Eating Behaviour, Division Human Nutrition and Health, at the Wageningen University in the Netherlands. The objective of the Sensory Science and Eating Behavior group is to unravel the psychobiological mechanisms underlying eating behaviour. The mission of the group is "to make healthy choice the happy choice". Wageningen University is responsible for the 2-year MSc program on Sensory Science, including technological, biological, psychological and sensometric approaches to sensory science. De Graaf is educated as a nutritionist. In 1988 he defended his Ph.D thesis on the perceived sweetness intensity of mixtures of sweeteners. He published about 260 papers, and his h-index is 53. His teaching focuses on the meaning of sensory signals for eating behaviour and the regulation of energy intake. His attention focuses on different groups (children, elderly, normal – overweight people), effects of properties of food on choice and intake with modern techniques of measurement (e.g. MRI). De Graaf is associate editor of Food Quality and Preference, and section editor of Physiology and Behavior.

Abstract

Title: Sweet taste, appetite and obesity: Is there a link?

Sweet taste is conceived to signal the energy content of foods (assumption 1). As obese people ingest more energy, there is the intuitive notion that obese people have a sweet tooth (assumption 2) or ingest more energy from sweet tasting foods (assumption 3). These ideas circled around the popular press since the 1980's and they still have a widely spread circulation in the societal discourse today. However, data have repeatedly shown that these assumptions are wrong. In four recent studies, using data from the Australian (n=377 foods), Dutch (n=469), Malaysian (n=423) and American food supply (n=237), it was shown that perceived sweetness intensity did not correlate with the energy content of foods (r's resp.: -0.08, 0.11, 0.04, and 0.11). Salt, umami and fat sensation intensity were better predictors of energy content.

Since the beginning of the 1980's various studies with increasing numbers of subjects and more advanced methodologies showed that normal weight and obese subjects have similar sweetness preferences. In one recent study, in two independent Dutch subject populations (n=1351; n=944), we showed that the average contribution of sweet tasting foods to the overall energy intake is slightly lower in obese people (23%) than in normal weight people (26%). When it comes to the role of properties of food in the regulation of appetite and food intake, it is advised to focus on the energy density and texture/eating rate of foods, instead of focusing on sugar and fat per se. Dozens of studies have repeatedly shown that food with a lower energy density and/or a lower eating rate lead to a lower energy intake.

References:
1. van Langeveld AWB, Teo PS, de Vries JHM, Feskens EJM, de Graaf C, Mars M. Taste-related energy intake by gender and weight status in the Netherlands. Brit J Nutr. 2018; 118:1095-1106.
2. Appleton KM, Tuorila H, Bertenshaw EJ, de Graaf C, Mela DJ (2018) Sweet taste exposure and the subsequent acceptance and preference for sweet taste in the diet: Systematic review of the published literature. Am J Clin Nutr 2018;107:405-419
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4. Deglaire A, Méjean C, Castetbon K, Kesse-Guyot E, Hercberg S, Schlich P. Associations between weight status and liking scores for sweet, salt and fat according to the gender in adults (The Nutrinet-Santé study). Eur J Clin Nutr 2015; 69: 40-46

Dr John Sievenpiper, University of Toronto, Canada

Biography

Dr. Sievenpiper is a Clinician Scientist, who holds appointments as an Associate Professor in the Department of Nutritional Sciences and the Lifestyle Medicine Lead in the MD Program at the University of Toronto. He also holds appointments as a Staff Physician in the Division of Endocrinology & Metabolism and Scientist in the La Ka Shing Knowledge Institute at St. Michael's Hospital. Dr. Sievenpiper completed his MSc, PhD and Postdoctoral Fellowship training in the Department of Nutritional Sciences at the University of Toronto. He completed his MD at St. Matthew's University followed by Residency training in Medical Biochemistry at McMaster University leading to his certification as a Fellow of the Royal College of Physicians of Canada (FRCPC). His research is focused on using randomized controlled trials and systematic reviews and meta-analyses to address questions of clinical and public health importance in relation to diet and chronic disease prevention. He currently holds a Diabetes Canada Clinician Scientist Award and Banting & Best Diabetes Centre Sun Life Financial New Investigator Award. He has authored more than 150 scientific papers and 13 book chapters. Dr. Sievenpiper is directly involved in knowledge translation with appointments to the nutrition guidelines' committees of Diabetes Canada, European Association for the study of Diabetes (EASD), Canadian Cardiovascular Society (CCS), and the Canadian Obesity Network.

Abstract

Title: Latest evidence on low calorie sweeteners' role in weight management in children and adults

Sugars have emerged as the dominant public health concern. Major health agencies have recommended that added/free sugars be reduced to <5-10% of calories. The use of low calorie sweeteners represent an important strategy to achieve these reductions. Although approved as safe by international regulatory agencies, there is an emerging concern that low calorie sweeteners may not have the intended benefit and may even increase the risk of obesity and its downstream cardiomeatbolic complications. Several health authorities have specifically recommended against the use of low calorie sweeteners to replace sugars. A careful review of the available evidence suggests that that a number of important methodological considerations have been overlooked such as reverse causality in prospective cohort studies and the nature of the comparator in randomized controlled trials. If one accounts for these considerations, then the concerns appear unfounded. Whereas prospective cohort studies that model low calorie sweeteners as baseline or prevalent exposures have shown an adverse association of low calorie sweeteners with weight gain and incident diabetes and cardiovascular disease, those that adjust for reverse causality by modelling the exposure as change show the opposite association with weight loss and no adverse associations with diabetes or cardiovascular disease. Network and pairwise meta-analyses of randomized controlled trials, which provide a better protection against bias, also show that low calorie sweeteners have the intended benefit when accounting for the calories available to be displaced from the comparator. Comparisons with sugars show the expected weight loss and related improvements in cardiometabolic risk factors while comparisons with water show the expected lack of difference. Overall, the available evidence supports the intended benefits of low calorie sweeteners as being similar to that of other strategies to reduce excess calories from sugars, such as water. More research remains a priority for improving the certainty of the estimates.

References:

1. Azad MB, Abou-Setta AM, Chauhan BF, et al. Nonnutritive sweeteners and cardiometabolic health: a systematic review and meta-analysis of randomized controlled trials and prospective cohort studies. Canadian Medical Association Journal. 2017;189:E929-E39.
2. Sievenpiper JL, Khan TA, Ha V, Viguiliouk E, AuYeung F. The importance of study design in the assessment of nonnutritive sweeteners and cardiometabolic health. CMAJ. 2017 Nov 20;189(46):E1424-E1425.
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5. McGlynn N, Khan TA, Sievenpiper JL. Systematic review and meta-analysis of low calorie sweetened beverages versus water and glycemic control. Proceedings of the 36th International Symposium on Diabetes and Nutrition, Opatija, Croatia, Jun 27-29, 2018

Dr Charlotte Hardman, University of Liverpool, UK

Biography

Dr Charlotte Hardman is a lecturer in Psychology at the University of Liverpool. She is interested in psychological determinants of appetite and eating behaviour and the application of this knowledge to interventions for health behaviour change. She completed her undergraduate degree in psychology at the University of Leeds and her PhD research at Bangor University. Her research portfolio encompasses experimental studies on basic mechanisms of appetite control through to interventions to increase healthy dietary behaviours in children. In current work, she is examining the effects of low-calorie sweetened beverages on appetite in a large randomized controlled trial for weight management (the SWITCH study). In the recently-awarded SWEET project grant (European Commission Horizon 2020) she will be working with 28 partners from across Europe to investigate the consequences of sugar replacement in foods and beverages. She has published more than 40 peer-reviewed articles and co-ordinates the North West Network for the Association for the Study of Obesity.

Abstract

Title: How does consumer perception about low calorie sweeteners affect food behaviour and energy intake?

Consumption of low-calorie sweetened (LCS) beverages has increased significantly. Previous research indicates that some individuals frequently consume high quantities of LCS beverages while others choose to avoid them. Little is known about the psychological factors, such as beliefs and attitudes, which influence and maintain LCS beverage intake. To address this gap in knowledge, we have developed a novel questionnaire to quantify beliefs and attitudes towards LCS beverages. Using this tool, we have found that frequent consumers (>825 ml LCS beverages per day; N=108) believe that LCS beverages are highly palatable as well as being effective in controlling appetite (hunger, cravings) and body weight. Non-consumers (N=103) did not share these beliefs. Frequent consumers also had higher levels of dietary restraint and body weight concerns than non-consumers, suggesting that they may use LCS beverages as a strategy to control food intake. To further test this idea, we conducted a laboratory study with frequent consumers (N=158) to examine food consumption when LCS beverages were available compared to when they were unavailable. Results indicated that participants ate fewer calories from sweet and savoury snack foods, felt less guilty about their food intake and more in control of their eating when LCS beverages were available compared to unavailable. Together, these findings suggest that positive beliefs about palatability and appetite control are key determinants of LCS beverage consumption. Results also indicate that LCS beverages may be used as part of a successful strategy to control food intake and reduce negative psychological states associated with eating.

References:

1. Rogers PJ, Hogenkamp PS, de Graaf C, Higgs S, Lluch A, Ness AR, Penfold C, Perry R, Putz P, Yeomans MR, Mela DJ. Does low-energy sweetener consumption affect energy intake and body weight? A systematic review, including meta-analyses, of the evidence from human and animal studies. International Journal of Obesity 2016; 40(3):381-94.
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Session 3 – Low calorie sweeteners and glucose control: can they aid in diabetes management?

Dr Marc Fantino, CREABio Rhône-Alpes, France (chair)

Biography

Marc Fantino is a Medical Doctor (MD) and Doctor of Sciences. Appointed as full professor at the Medical School of the University of Burgundy (1982), he was head of the Department of Human Physiology and Nutrition from 1987 to 2013 and also head of a medical department at University-Hospital of Dijon-France. At the same time, he was Director of the Doctoral School of Life Sciences of the University of Burgundy (1993 to 2001), expert at the French National Agency for Food Safety (1996-2006) and also Chairman of the National Nutrition and Health Program logo award committee (2004-2011).

Being now retired from the University of Burgundy since 2013, as an honorary Professor he co-founded and managed a clinical research organization, CREABio Rhône-Alpes®. In this centre, applied research is implemented in the fields of the sensorial and metabolic processes which control feeding behaviours and body weight regulation in humans. Different behavioural, neurophysiologic and pharmacological approaches are developed.

Prof Wendy Russell, University of Aberdeen Rowett Institute, Scotland, UK (chair)

Biography

Wendy is a Professor of Molecular Nutrition and Gut Health Lead at the University of Aberdeen Rowett Institute, in Scotland, UK. Wendy is a chemist specialised in molecular nutrition researching the complex interplay between diet and health. Her research aims to establish the effect of our diet on several population groups and through dietary interventions, to understand the role of food in preventing disorders such as cardiovascular disease, type 2 diabetes and cancer. Wendy has funding from the Scottish Government to investigate the potential of novel crops, particularly in protein provision for the future and the exploitation of underutilised plant species to improve nutrition and agrobiodiversity. As well as researching new opportunities for the UK Food and Drink industry, Global Challenges funding is allowing translation of this work to benefit small-scale rural farmers and co-operatives in sub-Saharan Africa. Wendy is an associate editor for Microbiome and chairs International Life Science Institute expert groups on ‘nutritional management of postprandial glycaemia’ and ‘efficacy of intervention in those with metabolic syndrome’.

Dr Hugo Laviada Molina, Marist University of Mérida, Mexico

Biography

Dr Hugo Laviada Molina is a clinical endocrinologist who obtained his medical degree from the University of Yucatan, in Merida, Mexico, and graduated from the postgraduate unit of the Faculty of Medicine of the National Autonomous University of Mexico. He received a master's degree in Medical Sciences (in endocrinology) from the University of Sheffield, UK. He is also a graduate in clinical nutrition and obesity at the Institute of Technology and Higher Education of Monterrey, (Campus Guadalajara), in Mexico. Currently, he is a professor-researcher in Metabolism and Human Nutrition at the Marist University of Mérida, Mexico. He belongs to the national system of researchers of the National Council of Science and Technology of Mexico (CONACyT). He is titular member of the Mexican Society of Nutrition and Endocrinology and of the Latin American Diabetes Society being coordinator of their position papers on low calorie sweeteners.

Abstract

Title: Do low calorie sweeteners affect glycaemic control and insulin sensitivity?

When only observational data are considered, several cohort studies have shown an association between type 2 diabetes (DM2) and the use of low calorie sweeteners (LCS). However, when controlled clinical trials are assessed, the vast majority of them show that LCS have a neutral effect on outcomes such as glycosylated haemoglobin (HbA1C), blood insulin, and fasting or postprandial glucose levels. Moreover, in trials where LCSs are integrated within a structured nutritional plan as a replacement for sucrose, discrete benefits can be seen on these clinical parameters. It would seem that, considered separately, observational and interventional studies report contradictory conclusions regarding LCS on metabolic impact. The positive association between LCS use and risk of DM2 found in some cohort studies seems to be mediated, at least in part, by confounding factors, in particular adiposity, and the so-called "reverse causality" effect.

Recent reviews have assessed the published controlled trials, which represent the highest level of evidence, examining the effect of LCS on the metabolism of carbohydrates. In a review conducted by Romo-Romo et al in 2016, the heterogeneity of the studies did not allowed to conduct a meta-analysis. Using Romo-Romo et al data and the studies published thereafter, we identified 30 intervention trials. All trials assessed the effect on blood glucose: 22 studies (73,3%) did not find significant changes, 5 studies (16.7%) reported a slight decrease with LCS use, and 3 studies (10%) a slight increase. In the studies reporting improvements in metabolic parameters, evidence suggests that this is due to the substitution of sugars, rather than to an intrinsic effect of LCS. Per se these additives do not seem to have an effect on carbohydrate metabolism and on blood glucose levels.

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Prof Ian Rowland, University of Reading, UK

Biography

Ian graduated with a BSc (Hons, First Class) and PhD in microbiology from University College London. Prior to joining the University of Reading in 2007 as the Hugh Sinclair Professor of Human Nutrition, he was head of nutrition at the University of Ulster and Director of the Northern Ireland Centre for Food and Health. Currently, he is Editor in Chief of the European Journal of Nutrition. His main research area is the interaction of diet, gut microbiota and health with a particular focus on the metabolism of phytochemicals and impact on health. In 2005 he was awarded an honorary doctorate from the University of Gent in Belgium for his work on nutrition and cancer. He has published over 400 papers and is on the Thompson-Reuters List of Most Highly Cited Researchers 2016.

Abstract

Title: Low calorie sweeteners and gut microbiota: Why is there a debate?

The human colonic microbiota is a large and complex microbial community. Over 1000 bacterial species have been identified with about 160 being found in the gut of any individual. The size and diversity of the microbiota is reflected in extensive metabolic activities. Observational studies comparing the faecal microbiotas of healthy subjects with those of patients, strongly suggest an association of gut microbiota composition and the aetiology and/or development of a range of gastrointestinal diseases and also a link with obesity and diabetes. However, the precise organisms involved are difficult to identify.

The interactions of low/no calorie sweeteners (LCNS) and gut microbiota has been the subject of numerous studies in laboratory animals and human subjects. LNCS are a structurally diverse group of compounds that have very different metabolic fates following consumption. Most (e.g. acesulfame K, saccharin, and sucralose) are not metabolized by gut bacteria. Stevia is a notable exception as its glycosidic forms are hydrolysed by the microbiota, releasing steviol, which is then absorbed intact without further bacterial metabolism.

LNCS are consumed at such low levels that they are unlikely to have a direct, clinically meaningful impact on the gut microbiota. Nevertheless, a few studies on saccharin have shown effects on microbiota composition or metabolism, although only at very high doses above normal human consumption. Studies with other LCNS show either no, or inconsistent, effects on the microbiota, probably as a consequence of design issues and lack of adequate controls. Overall, the evidence indicates that LCNS have minimal impact on gut microbiota.

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Dr Duane Mellor, Coventry University, UK

Biography

Duane has worked clinically as a dietitian, mainly in diabetes management and education and then as a researcher in clinical trials. However, reflecting back on the first 2 decades of his career he has begun to question a number of aspects of nutrition and dietetic practice. He is now interested in looking at evidence in nutrition, both in terms of causality and quality along with how this is communicated to the public by the media. Looking to challenge thinking in this area, to consider aspects of benefit and the risks of harm, ultimately looking at how the public can be best supported to eat food they enjoy that also supports good health.

Abstract

Title: Low calorie sweeteners' role in the dietary recommendations for people with diabetes

The first recommendation of the Diabetes UK Nutritional Guidelines is to support 'an individualised approach to diet taking into consideration the person's personal and cultural preferences'. This is framed in recommendations based on foods rather than nutrients. There are recommendations which encourage a reduced consumption of red and processed meat along with less refined carbohydrates and sugar sweetened beverages. With respect to the latter points, low calorie sweeteners have a potential role in helping individuals to reduce their sugar and energy intake. There has been a number of reports suggesting that intakes of sweeteners may increase the risk of developing type 2 diabetes. However, this data is not consistent and relates to the development of type 2 diabetes and not its management. Therefore, it is apparent, in line with current guidelines low calorie sweeteners have the potential to be part of an individualised dietary approach. Although low calorie sweeteners are not the dietary solution on their own to manage type 2 diabetes, they can be a useful way to reduce energy and free sugars intakes. Whether the inclusion of low calorie sweeteners is likely to benefit someone living with diabetes is likely to depend on which foods and drinks they are found in and how these foods are incorporated in a dietary pattern. Consuming low calorie sweeteners as part of a diet based on vegetables, fruits, wholegrains, fish, nuts and pulses could be a way of maintaining quality of life through the addition of sweet flavours without energy or sugar.

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Panel discussion session – Sugar reduction and low calorie sweetener use from a public health perspective

Prof Peter Rogers, University of Bristol, UK (chair)

Biography

Peter Rogers is Professor of Biological Psychology at the University of Bristol, UK. He trained in biological sciences and experimental psychology at the University of Sussex UK. He completed his PhD and postdoctoral work at the University of Leeds UK, moving to the Institute of Food Research, Reading UK in 1990. He moved to the University of Bristol UK in 1999, where he teaches biological psychology and does research on nutrition and behavior: which includes work on human appetite and weight control, low-calorie-sweeteners, food choice, dietary effects on mood and cognitive function, and the psychopharmacology of caffeine. He is a Chartered Psychologist, a Fellow of the British Psychological Society, and a Registered Nutritionist. His publications include over 200 peer-review journal papers.

Prof Judith Buttriss, British Nutrition Foundation, UK

Biography

Professor Buttriss became Director General of the British Nutrition Foundation (BNF) in October 2007, having been BNF's Science Director for almost 10 years. She has longstanding links with several universities and over 30 years of experience in providing targeted advice on nutrition and applying science to develop nutrition policy (including several UK government initiatives focusing on nutrient profiling in relation to children's diets and healthy eating in general). She sits on a number of advisory committees considering nutrition and the food supply and has written numerous reviews, articles and book chapters on a wide range of diet and health topics, including topics as diverse as health claims, plant foods and health, child nutrition, healthy ageing, and sustainable diets.

Abstract

Title: The use of low calorie sweeteners in sugar reduction: challenges and opportunities

Reduction in sugars intake is being advised in many countries around the world to reduce risk of obesity, which is a global public health concern. In the UK, where the food industry has a target to remove 20% of sugar in key products by 2020 and a new softs drinks levy came into force in April this year for those drinks with ≥5g/100ml sugar, low calorie sweeteners are being increasingly used in some product categories to achieve sugar and calorie reduction. The European Food Safety Authority regulates safety and has approved health claims for some low calorie sweeteners in relation to dental health and glucose control. However, there are technical issues with some sweetening products (e.g. taste perception) and legislative restrictions to their use (artificial sweeteners can only be added to certain foods and only if the food is 30% lower in sugar and energy compared to the standard product). Consumer concern about the general use of food additives, negative perceptions fuelled by media articles about their safety and physiological effects (e.g. in relation to appetite, desire for sweet foods and the gut microbiome) and the consumer trend towards 'clean label' products are also key challenge to the use of these sugar alternatives. Further research, particularly investigating the impact of consumption of sweet tasting foods/drinks on subsequent generalized sweet taste preferences and intakes, and the effects of sweeteners of human gut microbiota, is needed to support clear, consistent advice.

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Notes

About the ISA

The International Sweeteners Association (ISA) is an international non-profit organisation with scientific aims representing suppliers and users of low calorie sweeteners. Established over 35 years ago, the ISA is recognised by the European Commission, national and international regulatory authorities, and the World Health Organization, and has Non-Government Observer status with the Codex Alimentarius Commission which establishes international food standards.

The ISA aims to inform and to educate on the most up-to-date nutritional and scientific information in relation to the role and benefits of low calorie sweeteners, and the foods and beverages that contain them. The ISA also encourages research into, and enhances understanding of the role that low calorie sweeteners can play in achieving a balanced diet.

Conference Accreditation

Media Partners

International Sweeteners Association (ISA)
Avenue de Tervueren 13A, Box 7
B - 1040 Brussels
+32 2 736 53 54
info@sweeteners.org