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Hello, everyone. I'm Joan Koelemay, a registered dietician with the Beverage Institute for Health and Wellness of the Coca-Cola Company and your host for today's Webinar, Straight Facts about Aspartame and Other Low Calorie Sweeteners with Dr. George L. Blackburn and Dr. Bernadine Magnuson. We are using the term "low calorie sweeteners" in today's presentation to refer to sweeteners such as aspartame, sucralose and saccharine, which do not contribute calories or other nutrients to the diet.

These sweeteners are also known as non-nutritive or intense sweeteners or sugar substitutes. Since this is an extensive topic, we've asked today's speakers to focus primarily on aspartame, the most common low calorie sweetener used in foods and beverages today. The Beverage Institute for Health and Wellness of the Coca-Cola Company is proud to sponsor this second in a series of educational Webinars which bring together dietary professionals and recognized experts in the field of nutrition. Our first speaker, obesity expert Dr. George L. Blackburn, will address the impact of low calorie sweeteners on society and food intake and the usefulness in weight management.

Dr. Blackburn serves as the S. Daniel Abraham Associate Professor of Nutrition and Associate Director of the Division of Nutrition at Harvard Medical School. He is the Chief of the Nutrition and Metabolism Laboratory and the Director of the Center for Study of Nutrition Medicine affiliated with Beth Israel Deaconess Medical Center in Boston. Dr. Blackburn has published widely on nutrition, medicine and metabolism and is on the editorial board of and reviewer for several journals, including *The Journal of the American Medical Association*, *The New England Journal of Medicine* and the *American Journal of Clinical Nutrition*. He is an honorary member of the American Dietetic Association and an American Society for Nutrition fellow.

Dr. Blackburn, you're on.

DR. G. BLACKBURN

Thank you. I want to thank the audience for taking the time to participate in this Webinar because this is a very important topic. I'm sure that none of you don't realize that we are over-consuming calories. I think it's a little surprising how few calories that we have to consume to gain weight; ... calories to a pound and 100 calories will do ten pounds of weight gain. It's a pretty exciting time right now because the CDC is just reporting that we have a plateau in weight gain. Over the last 25 years the number of people who are obese doubled and now that has stopped for the population. Some are not as lucky as others and



have a lot of work to do, particularly the severe obese and the adolescent obese. There is good news and I do want to make sure that you understand the benefits of low calorie sweeteners.

As you'll see, I want to cover four topics quickly with you: Low calorie sweeteners in society, weight loss and maintenance, palatability and hydration, and then to champion small steps to achieve weight loss and balance lifelong eating habits. The first thing I'd like to get out of the way is an explanation that low calorie sweeteners are for the most part food ingredients. To be approved for human use, these need to go through rigorous testing by the FDA and be proven safe. This is a decade-long effort, but I think we can quickly set aside, even though we're going to hear more about that subject, that what we're talking about are products that are tested, are safe and the benefit they have is they give us the taste and flavor of sweetness without the calories. For the most part we'll be talking a minimum of 100 calories for 25 grams of sugar, so 100 calories would, of course, be the difference between the weight before the epidemic and the weight now, which is just ten pounds difference between the weight we were and the weight we are now and between most people being in the normal weight range and those being overweight and obese.

Let's look at the issue of low calorie sweeteners in society. I think it's important to realize that for the most part, the foods we select are foods that we see, taste and smell. The reason for that is these centers are located in the cerebral cortex. This, of course, is the gray matter of your brain and this is where the thinking, the memory, the behavior is located. Sure, we have a lot of connections between the other parts of the brain and the GI tract, but we don't feel those; those are innate, if you will.

What you want to see on this first slide is the importance of century-specific society. What that means is that when you ingest foods with low calorie sweeteners, ... sugar, people can be satisfied with the sweetness and without the calories. If you will, you get your cake and eat it, too; it just has the sugar replaced with low calorie non-caloric sweetener.

This work, of course, has been studied by many people. We're providing the references for this. Barbara Rolls, of course, is the most well-known and has studied this to the greatest extent. You can see that her findings are that intense sweeteners have never been found to cause weight gain in humans, although several investigators have reported increases in ... of hunger associated with aspartame. Most have found that aspartame associated with a decrease or unchanged rations to hunger. If you look at the report above, when people have found low calorie sweeteners not reducing hunger satiety, the comparison has been with water. Let's look at some data on the next slide.



You can see this study of Dr. Rolls. You can see that when you have intake associated with water, with aspartame versus sucrose, the water and aspartame have no difference in the caloric intake when you add the water. The exception, of course, is when you add calories. There's no ability of these ... to reduce food caloric intake and therefore they add approximately 100 calories to your diet.

I really would like to draw your attention to this next slide. This, of course, is the standard technique of looking at each eating event and each effect on, in this particular case, hunger. Now, when you wake up in the morning, the way the scale works, you're at a hunger of about seven. If you didn't eat correctly the day before you may be very hungry. Or, if you overate the day before, you may have a slightly lower score. See what the impact of just the breakfast, which is the first dip on the slide that you see, and the score goes from seven to below four, three or two in this area. That's the typical effect of a proper breakfast, 450 calories eaten over 20 minutes. You will be quite satisfied. In fact, as you can see, the scale then goes for another three or four hours until lunchtime and you never get back up to that score of six or seven.

Now, in this particular study, a free meal beverage was offered about 3.25 hours. You can see there's very little impact in the control of hunger at this time. It builds up to lunch and once again, like breakfast, again 450 calories consumed over 20 minutes, and you get this dramatic drop in hunger to a lower score, from being very hungry to having little hunger at all. You can see that compared on the right. Aspartame contained products for that product, saccharine, sugar and water. Essentially, the influence on hunger is very small.

Really, what the sweeteners are doing is they give your brain the satisfaction of sweetness, but any control of caloric intake would be the delivery system. If you took a beverage that had 240 ccs, an eight ounce glass container, you'll have little effect in this area. If we put it in solid food it'll have an even larger one.

Let's go on now and look at the issue of weight control. Again, we want to make the point that 100 calories is the discretionary calories that one has a day. If you took those 100 calories, the sugar, of course 25 grams in this case, versus a non-caloric, then we would be working with 100 calories. For the average female, this is all the discretionary calories that they have.

In the small ... and the concept now of the fact that we've burned 15 calories per pound of body weight, 150 pound person, we'd, of course, be burning 2,200 calories. One hundred calories would be 5% of the calories. That's a big expenditure. As you're counting people, that is a portion size that makes a lot



of difference. As we could look at the next slide and see about weight loss, this is an important reference for you to have of meta-analysis published in a nutrition bulletin.

You can see the meta-analysis demonstration that using food and drink sweetened with aspartame instead of sucrose resulted in a significant reduction of both energy intake and body weight. Meta-analysis of both energy intake and weight loss produced an estimated weight loss of about 0.2 kilos per week. We have to do a lot more things besides selecting the sweetener for our brain memory and brain focus, but nevertheless, this will allow you to lose weight and that is an important goal.

The next study I would like to bring to your attention is a brand new one. You can see it was just published in 2007 in pediatrics. It's from the group American on the Move studying overweight children. Again, 100 children who were given a non-nutrient sweetener – in this particular case Splenda – and a pedometer. In the small steps what they were wanting to do is reduce 100 calories by replacing sucrose with sucralose and improving the steps, approximately 2,000 steps per day.

They were monitored. On the next slide you can see the outcome of this. Children who were in the 100 calorie sweetener substitute had a greater reduction in the body mass index over the six months of the study. I think we have ample evidence that this is a cog in a wheel. This is one thing that you should do in your counseling. Don't use sugar if you're interested in getting to a healthier weight when we have the safe, effective, non-caloric sweeteners.

Looking at the next slide, continuing that same study. A greater portion of children maintained this reduced BMI per age as compared to those that were in the ... You can see we have the control and the American on the Move.

Finally, we looked at this. I think we're probably one of the largest, longest studies. It was published in 1997 in *The American Journal of Clinical Nutrition*. We did a randomized control trial in which again, we've replaced a sucrose-containing beverage with aspartame. The sweetness, of course, was the same in this area. We also gave the participant a 1,000 calorie diet and we also encouraged them to get 200 minutes of walking per week and to sustain that for a year. Again, you see a post-weight loss diet of about 1,500 calories. Then we did a two-year follow-up. Let's see what we got looking at the study.

We got the standard intervention in which we were doing the behavior change. Here we got a 10% weight loss. All of you who are in clinical trials realize this



was a very effective, comprehensive, multi-disciplinary intervention. We achieved a 10% weight loss with that intervention. Then we followed them.

You can see that by the time we got to the first year after that, at 71 weeks, we had a significant difference. We had a small 1% to 2% regain of those who were on the aspartame treatment arm whereas the non-aspartame group had regained all the weight to about 5%, so they regained about half the weight. We were able to sustain that while still using the same treatment that we used in the first 17 weeks so that at the 175th week we still had a 6% weight loss whereas the control had almost regained their weight. We think that this is an approach to your weight loss and weight maintenance that can't be ... These, of course, are clinically significant changes in body weight.

Let's turn now and talk about this issue of discretionary calories. I think all of us who know the pyramid and know the new guidelines know that the priority of our eating is to get in healthy food that will provide us all the nutrients that we need for a healthy diet and healthy living. That involves almost two-thirds if not three-fourths of all the food that we eat, but there are discretionary calories. Once you do get the healthy foods in, there are roles for eating or taste satisfaction. Again, we're suggesting that exchanging sucrose-containing beverages, foods and desserts for low calorie sweeteners is one way that you can have more discretion.

We're giving an example of the typical person who would have approximately 167 discretionary calories. You can see by just replacing a typical food or beverage which has that many sucrose-containing calories you would broaden the volume of food that you could have for discretionary calories.

Again, just to make the point that I'm trying to make, 167 calories, of course, would be a change in weight of one to two pounds. That, in fact, is the difference between both examination ... and the ... studies that the change in weight, as you look, is just about 20 pounds over the eight-year time period. This could be one way, if we could just make this one exchange of diet counseling from sucrose, sugar-containing products either in food or beverage to non-caloric. Then we would have one way in which to stop weight gain and stop the epidemic of obesity.

Again, the calorie ... we all know this equation, that a pound of weight is theoretically a difference of 3,500 calories and a pound of fat. Ninety percent of people just adding a mere 50 calories to their diet would be enough to reduce the offset of the weight gain that 90% of the population undertake. Of course, know the people who are red flagged clients or patients who gain more than five pounds, but for all practical purposes, 90% of the people in prevention, all they



would need to do is make this substitution of caloric-containing food and beverages for non-caloric. They would control the weight gain and have additional capacity to use the discretionary calories. For all practical purposes, they could double the volume because there'd be no calories in it.

I do want to emphasize that there's another way to get additional discretionary calories, and that's to increase your physical activity. We certainly want people to have purposeful activity at a minimum of 30 minutes a day for fitness and health. If you put these things together, more steps allow you to consume more food. Non-caloric sweetener will raise the volume and you should get better satiety and therefore better ...

I just want to give some examples of that. By looking at different categories of men and women at different ages, I drive home the fact that the physical activity, as you can see, with no physical activity versus physical activity, you have about 300 or 400 calories on the table that you wouldn't otherwise have. The outcome of this talk is to push both the physical activity and modest brisk walking, 2,000 steps minimal incrementally, and to take advantage of the fact that we can meet these cerebral cortex cravings for flavor and taste without the calories.

Let's look at Mary, who is 25. She's not physically active. She has a caloric budget of 2,000 calories a day and she needs 1,735 just to get the essential nutrients. How do we know that? Well, we go to the pyramid and we plug in the data. We realize that the healthy food selection will add up to 1,735 calories until we approach 75% or 100% that the nutrient allows. That then leaves about 265 calories to be discretionary.

Now, how can she spend that? You can see some choices. In the one cup of fruit-flavored low-fat yogurt the discretionary calories would be 100. A 12 ounce can of regular soda would be 155 calories. A cup of fruit punch would be 115. Three ounces of regular ground beef that was 80% lean would be 65 calories. Well, she did all of those. You can see her discretionary calories would come up to 435. You can easily replace those calories in your strategy in this area and save 220 calories. How? Switch from regular to diet soda. Switch from 80% lean ground beef to extra lean, which is ... that one could use.

Again, you can see the efficiency of making the soda switch from regular soda to low calorie soda. You can see the benefit of portion size in ice cream. You can see the low calorie substitution of pudding or a lower volume. You can see that if you hold onto your Oreo cookies you're not going to have much say ... two teaspoons of sugar would be 35. The biggest bang in all of this is to look at



caloric-containing soda and the fact that virtually everybody can make the switch to low caloric beverage intake.

Let's move on now to the ... hydration. Now, really, the purpose of flavoring fluids is that they facilitate our intake. We need six or eight eight-ounce glasses of fluid a day to meet the fluid requirement of a quart-and-a-half that we need each day. It's very hard to do that. Of course, we want water, tea and coffee, but many people will not reach the intake without the beverage. Again, we have the opportunity through a lot of flavored juices, teas and sodas to get the hydration. That really is one of the most important things for health and for satiety that we're shooting for.

The flavoring of these fluids itself doesn't increase the appetite, but the fluid does. Again, what's the payback for hydration? Taste, hydration and then the ...specific satiety. It's in the volume. The taste ... cerebral cortex giving you a satisfaction of your cravings and therefore you feel better.

I want to finish then with the most important message, and that is what 100 calories can do to your weight and how these small changes that would lead to a 10 pound weight loss, which can be easily achieved by the simple steps of a little more exercise and fewer calories in this particular presentation by replacing sugar with non-caloric sweetener. I think a lot of people don't appreciate these small weight changes, what their impact would be on diabetes, cardiovascular disease, blood pressure, lipid profiles, overall health status, sleep and the benefit of getting more out of any obesity medication one would be using. These are established benefits from a 10 pound weight loss.

These are the kinds of small steps that people can do for the rest of their lives. Of course we want to focus on not just saving the sucrose calories, but make sure that the diet has the volume and the benefit of the vegetable, fruit, whole grain, legume intake. We definitely need the fiber and we need the water, but we don't need the calories.

Here's a step that would go back to that satiety, that hunger scale that we looked at earlier. I do want to emphasize at breakfast, lunch or dinner, the first 450 calories that one consumes, that if you do that and you make it last over 20 minutes you will be surprised how the hunger will decrease and the need for additional foods just won't be there. This works to the cerebral cortex in what you feel and taste. It also will allow, in the 20 minutes, for ... hormones and stretch receptors in the stomach to communicate to the brain and therefore, this will be a satisfying meal that should last you three to four hours.



In summary, I'm suggesting that we have plenty of reason, that we have safe and effective ways to have a better weight control lifestyle through the use of low calorie sweeteners. They meet this all-important brain need of palatability and sweetness. They do increase the range of foods, particularly the volume that one uses. They do facilitate the compliance with restrictive eating ...

In summary, you can see that there are a variety of different products so that this really can fit into a lot of dietary plans that you would prescribe that would fit the patients and will make it easier that you take off and keep off the weight you want. I do want to acknowledge the people in our center who made this program possible, Christine Day and Shannon Fisher, who were instrumental in putting this presentation together.

I want to thank you for listening and considering. Particularly, I want to make available or bring to your attention a suggested reading list, particularly the last one. That's the evidence analysis library of *The American Dietetic Association* where you can find these references and others in support of this presentation. Thank you and have a good day.