



VOLUME 2 - ISSUE 14

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Dietary Recommendations for Patients with Diabetes

Our guest author is Nestoras Mathioudakis, MD from the Johns Hopkins University School of Medicine in Baltimore, Maryland.

After participating in this activity, the participant will demonstrate the ability to:

- Discuss how to counsel patients about the appropriateness of commercially available and medically endorsed diets for diabetes management.
- Describe the effects of alcohol on glycemic control in type 2 diabetes.
- Summarize the advantages and disadvantages of very low calorie diets for weight loss in individuals with type 2 diabetes.

Unlabeled/Unapproved Uses

Dr. Mathioudakis has indicated that his discussion today will not reference the unlabeled or unapproved uses of any drugs or products.

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Release Date:
September 15, 2016

Expiration Date:
September 14, 2018

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Podcast Transcript

BOB BUSKER: Welcome to this eDiabetes Review podcast.

Today's program is a follow-up to our newsletter on Dietary Recommendations for Patients with Diabetes. With us today is that issue's author, eDiabetes Review Program Director Nestoras Mathioudakis — Assistant Professor, and Clinical Director of the Division of Endocrinology, Diabetes, & Metabolism, at the Johns Hopkins University School of Medicine.

eDiabetes Review is jointly presented by the Johns Hopkins University School of Medicine and the Institute for Johns Hopkins Nursing. This program is supported by educational grants from AstraZeneca and Merck.

Learning objectives for this audio program include:

- Discuss how to counsel patients about the appropriateness of commercially available and medically endorsed diets for diabetes management.
- Describe the effects of alcohol on glycemic control in type 2 diabetes.
- Summarize the advantages and disadvantages of very low calorie diets for weight loss in individuals with type 2 diabetes.

Dr. Mathioudakis has indicated that he has no financial interests or relationships with any commercial entity whose products or services are relevant to the content of this presentation. He has also indicated that his discussion today will not reference the unlabeled or unapproved uses of any drugs or products.

I'm Bob Busker, managing editor of eDiabetes Review. Dr. Mathioudakis, thank you for joining us today.

DR. MATHIOUDAKIS: It's great to be back with you, Bob.

MR. BUSKER: We know that all the guidance recommends diet and exercise as first line therapy for type 2 diabetes. We also know that many clinicians are unsure about which diets to recommend and which to avoid. Your newsletter issue reviewed the recent investigations into many of these diets. Our focus today is on how that information can impact practice in the clinic. So if you would, please, Dr. Mathioudakis, start us out with a case scenario.

DR. MATHIOUDAKIS: This is a 60 year old Caucasian woman whose type 2 diabetes was diagnosed about 25 years earlier at age 36. She managed her diabetes with lifestyle for many years and was subsequently given a trial of metformin, which she couldn't tolerate because of GI side effects. She was then placed on a DPP4 inhibitor, sitagliptin; and subsequently pioglitazone, a TZD, both of which worked well for her for several years. As her disease progressed, she required addition of a sulfonylurea and eventually progressed to insulin. When I met her she had been on insulin for 11 years before that initial visit and had been on an insulin pump for the three years before her initial visit.

Her initial A1c was 7.7% and her BMI was 26.4. She was 5'3" and weighed 149 pounds. When I first met her we talked about her lifestyle, and she admitted that she was following a rather unhealthy diet that was high in fat, high in cholesterol, and low in fiber. Her history was also notable for nonalcoholic fatty liver disease, so she was really concerned about dietary approaches, not only for her diabetes but to prevent progression of her liver disease. She met with a nutritionist on several occasions, and at her first visit she asked my input about a particular diet she had read about online, the Fuhrman Diet, from one of his books called *The End of Diabetes*, and she asked me whether she should follow that specific diet for her diabetes.

MR. BUSKER: That Fuhrman book — it's been a best seller. But it's just one of the dozens, probably hundreds, of diet plans that are out there. In your practice, do your patients come to you asking you for specific input about a particular diet? How do you address their questions?

DR. MATHIOUDAKIS: I'm seeing more and more of this in clinic. You know patients have access to a large amount of information on the internet, and they are coming to me with really specific questions about particular diets they may have read about or heard about from friends. Interestingly, the *US News & World Report* recently rated 38 diet and eating plans with the help of a panel of diet and nutrition experts, and patients are coming to clinic with that information. But it turns out that very few of the diets ranked by *US News & World Report* have actually been evaluated rigorously for their effects on glycemic control in people with diabetes.

The American Diabetes Association does not endorse any specific macronutrient composition of diets, but there is evidence to favor certain types of diets for diabetes management. For example, a Mediterranean style diet, which we reviewed in this newsletter, a low fat diet, a vegan diet, even low protein diets — and of course low carbohydrate diets and low glycemic index diets — have all been tested in rigorous trials.

Unfortunately, most of the commercially available diet plans can't be easily categorized into one of these tested dietary plans. and the physician ultimately has to make some inferences about which category a specific diet then fits into. I tell my patients that ultimately the most important thing, especially if they're overweight or obese, is weight loss as the single most important factor for glycemic control. And it doesn't take much: even a modest weight loss of 5% to 7% of body weight has significant effects on blood glucose.

As for specific diets, in my experience, most diets plans result in weight loss by eliminating nutrient-poor foods and simple sugars like sweets, sodas, corn syrup-based sweets, and the like. I think it boils down to patient preference when advising on the selection of a particular diet — whether they like the foods that are advocated for the diet and it is something they think they could adhere to long-term.

MR. BUSKER: Your patient asked you specifically about the Fuhrman diet. "The End of Diabetes" is the title of his book. How did you assess the appropriateness of that diet plan?

DR. MATHIOUDAKIS: She was with me in the clinic but didn't have a copy of the book, and I wasn't familiar with it. But we have the internet in front of us in clinic, so I quickly Google-searched the Fuhrman diet, and in reading about it, quickly surmised it was essentially a vegan diet. It's touted as a "nutritarian" diet that is very high in fiber and low in glycemic load. On the website the five most important foods in this diet are beans, greens, nonstarchy vegetables, nuts and seeds, and berries. The diet advocates against barbecued meats, processed meats, commercial red meats, full fat dairy, fried foods, baked goods, soft drinks, sugars and sweeteners, processed foods, white flour, and white rice, with 85% of the caloric intake from plants. So in reading that in a matter of 30 seconds, I was able to infer that this diet has features of both a vegan and a low glycemic index diet, and we've shown in this newsletter that both of these diets have proven benefits on glycemic control. So I felt that this was a healthy diet, in line not only with the evidence but also with current ADA dietary recommendations, which encourage the intake of low glycemic index foods, lots of nuts and seeds, and avoidance of sugar-sweetened beverages and sodas.

Now, Dr. Fuhrman claims on his site and in his book that reductions of diabetes medications can occur by an average of 50% within the first week and that many patients who are on insulin can get off it within the first week of starting his diet. Since these claims seem to be based mainly on Dr. Fuhrman's clinical experiences rather than a published trial, I couldn't endorse those facts with the patient, but I did caution her that if she were to make a drastic change in her diet, her insulin requirements could fall very quickly as she began to eliminate high fat and starches and began to lose weight.

We were both on board with this, it was something that she was really interested in trying, and she decided to move forward with that diet.

MR. BUSKER: Following your response to her, what were the main changes she made in her current diet? And how did those changes affect her glycemic control?

DR. MATHIOUDAKIS: The main change was completely eliminating breads from her diet. She increased her intake of vegetables and fruits, but she also increased her intake of lean meats, which actually was not a key feature of the Fuhrman diet, and she said that she had found it really hard to feel full and satisfied without increasing her intake of animal proteins since she had cut out so much of her calories from breads. In addition to the dietary changes, she began walking 5,000 steps per day.

Her glycemic control, as expected, improved immediately. Within three months her A1c dropped from 7.7% to 6.6%. We had to cut the basal rates in her pump by 10% to 20% across the board, and she also began noticing an increase in the frequency of exercise induced hypoglycemia, which we addressed by having her use temporary basal rates during periods of exercise, supplemented by additional fruit intake before exercise. She lost eight pounds in three months, and her BMI was now at the high end of the normal range at 24.9. Over the next two years she's largely adhered to this "nutritarian" diet and has maintained A1c levels in the 6.5% to 7.1% range.

When I saw her most recently, her weight was 139 pounds and she had a BMI of 24.6. So this diet worked for her and she was able to sustain the weight loss.

MR. BUSKER: So this particular patient responded very well to this particular diet. Let me ask you about other patients who come to you asking for recommendations about other diets. Are there any of those diets you haven't felt comfortable endorsing?

DR. MATHIOUDAKIS: To be honest, Bob, I haven't had a patient ask me about a diet that I thought went completely against ADA dietary recommendations. Although I recognize that there are a large number of diets out there, many of them fad diets that are out for a year or two, we're likely as physicians to begin seeing diets that may not align with evidence-based principles of diabetes management.

For example, in the *US News & World Report* ranking that I mentioned earlier, the top three of the 38 diets reviewed were the DASH diet in first place, which was developed for hypertension control; the MIND diet, which came in second, is a combination of DASH diet and the Mediterranean style diet; in third place was the TLC diet, Therapeutic Lifestyle Change diet, which is very similar to the other two diets. All three of these diets align with the key principles of the ADA, which is high in vegetables, fruits, and fiber and low in saturated fat.

However, many familiar diets ranked lower in *US News & World Report* list, for example, the Atkins diet, which emphasizes very low carbohydrate intake with an increase in animal protein. This diet is very effective at inducing weight loss, but it ranks low on this list because of concerns that completely eliminating breads and grains may result in inadequate nutrients, and it also restricts vegetables, whole grains, and fruits.

As we reviewed in this newsletter, a low carbohydrate diet was superior compared to a low fat diet, which could lead you to conclude that a very low-carb Atkins style diet is beneficial in diabetes. I think it's important for the listeners to note that in the study comparing low fat to low carb, both groups had saturated fat restrictions to less than 10%, and that's not something that the Atkins diet recommends. So it's really difficult to say whether an Atkins style diet, which may be higher in saturated fat, is beneficial in the long term for type 2 diabetes.

MR. BUSKER: Another popular diet, particularly among the internet searchers, is the Paleo Diet. Your thoughts about that one?

DR. MATHIOUDAKIS: That's another popular diet that many of my younger patients are adhering to. It's a diet plan that's endorsed by some exercise programs like CrossFit. This is the "paleolithic diet," which encourages intake of animal protein and fat and elimination of grains and dairy, getting back to sort of a "paleo style" diet. This diet has also been criticized

because it may be hard to get all the nutrients needed by eliminating dairy and grains, and like the Atkins Diet, there hasn't been sufficient evidence to evaluate this diet in diabetes management.

If a patient comes to me preferring this type of diet, I think it would be important to monitor their weight loss, monitor effects on A1c and lipid status particularly, and if the diet is showing favorable glycemic and weight loss effects without any of the untoward effects on lipids, it would be reasonable to have them continue to follow this diet. Otherwise, I'd advocate for a diet that has been proved to have glycemic benefits.

MR. BUSKER: Thank you for that case and discussion, doctor. And we'll return, with Dr. Nestoras Mathioudakis from Johns Hopkins in just a moment.

SUSAN PORTER: Hello. I'm Susan Porter, clinical nurse practitioner and certified diabetes educator at the Johns Hopkins University School of Medicine. I'm one of the program directors of eDiabetes Review.

If you found us on iTunes or on the web, please be sure to subscribe. This podcast is part of Johns Hopkins eDiabetes Review, a new educational program providing monthly activities certified for CME credit and nursing contact hours, with expert commentary and useful practice information for clinicians treating patients with type 2 diabetes.

For more information or to subscribe to receive our newsletters and podcasts without charge, please visit www.ediabetesreview.org. Thank you.

MR. BUSKER: Welcome back to this eDiabetes Review podcast. I'm Bob Busker, managing editor of the program. We've been talking with Dr. Nestoras Mathioudakis from the Johns Hopkins University School of Medicine about how the information in his newsletter issue on Dietary Recommendations for Patients with Diabetes can be applied in the clinic. So let's continue, if you would please doctor, with another patient scenario.

DR. MATHIOUDAKIS: This was a 61 year old Hispanic woman with type 2 diabetes diagnosed in November of 2012. She had had prediabetes for many years prior to her diagnosis and a strong family history of type 2 diabetes. She had struggled with weight her entire life, and her medical history was notable for hypertriglyceridemia. Her A1c was 6.6% when diabetes was diagnosed and she was able to lose weight and maintain an A1c in the 6% to 6.5% range without medications for many years. In the last year, her weight began increasing and her A1c increased to 6.6%, so we decided to start her on metformin; she had a good response.

The patient was very concerned about deterioration in her blood glucose control: she monitored her fasting blood glucose daily and typically had fasting blood glucose readings between 108 mg/dL and 120 mg/dL. Her A1c on metformin at a dose of 500 mg twice daily was 5.7%.

She noted in clinic that whenever she has one to two glasses of red wine with dinner, her fasting glucose the following morning is consistently lower, often in the 90s; without the red wine, it was between the 110s and 120s. She asked me whether she should be drinking regularly to improve her glycemic control.

MR. BUSKER: The connection between alcohol intake and glucose levels — summarize what's known about that for us, if you would, please.

DR. MATHIOUDAKIS: We know from observational studies that moderate alcohol consumption compared to abstaining and compared to heavy drinking is associated with a lower risk of type 2 diabetes. Interestingly, while the risk is reduced for both men and women, a recent meta-analysis showed that there was a greater risk reduction for women than in men. Consumption of 24 g of alcohol reduces the risk of type 2 diabetes by 40% among women, whereas a similar daily amount reduces the risk by 13% among men.

A recent systematic review and meta-analysis published in the leading diabetes journal, *Diabetes Care*, in April 2015, showed that overall alcohol consumption did not influence insulin sensitivity or fasting glucose but did reduce A1c and fasting insulin concentrations. There was a sex difference: with women, alcohol consumption reduced fasting insulin and tended to improve insulin sensitivity, but the same was not observed with men.

MR. BUSKER: How does alcohol affect blood glucose levels? What do we know about the physiologic mechanisms?

DR. MATHIOUDAKIS: The main explanations for alcohol effects on glucose relate to insulin sensitivity, antiinflammatory effects, and the effects of adiponectin, a hormone involved in fatty acid breakdown and glucose regulation. A previous meta-analysis showed that alcohol consumption increased adiponectin levels but did not affect inflammatory markers. And a review of cross-sectional studies has shown that moderate alcohol consumption is positively associated with insulin sensitivity, although in that review, three studies did not show an effect, and results were inconsistent among the studies. Overall, I think consensus is lacking about alcohol effects on insulin sensitivity.

MR. BUSKER: Since your patient consistently reported a positive effect on her morning FPG after she had had wine with dinner, did you recommend that she start drinking regularly?

DR. MATHIOUDAKIS: No, I didn't advise her to begin drinking. She's someone who didn't drink regularly, and I think I had evidence to make that recommendation. The study by Gepner, et al that we reviewed in this month's newsletter tested the hypothesis about whether people who currently do not drink alcohol regularly would derive any glycemic benefits from initiating alcohol consumption.¹ That study did not support initiation of alcohol intake explicitly for glycemic control.

Among patients who choose to drink alcohol, moderation is key. The American Diabetes Association recommendation for adults with diabetes is one drink per day for women and two drinks per day for men. So if my patient were to choose drinking, I'd encourage her not to drink more than one glass of wine per night. Also, even though the alcohol in her case may be having some effect on her fasting glucose, alcohol has calories; it's weight promoting. If in the long run she begins to gain weight from the excess calories of the alcohol, this could compromise her glycemic control down the line.

MR. BUSKER: Other considerations about alcohol intake in diabetes management — what's important for clinicians to be aware of?

DR. MATHIOUDAKIS: It's important to recognize the possibility of delayed hypoglycemia from alcohol intake, and this is particularly a problem for people who are being treated with insulin or insulin secretagogues, sulfonylureas, and glitinides. Generally, social alcohol intake is not a major risk factor for either hyper- or hypoglycemia in patients with diabetes, although there may be a delayed risk of hypoglycemia in the morning following an evening of alcohol intake. In other words, during periods of fasting. These at-risk patients should be made aware of that possibility. Drinking on an empty stomach, like having cocktails before dinner, drinking before exercise, or drinking when blood glucose is already low or trending downward, may increase this risk.

The other important thing to consider is the rate at which one metabolizes alcohol. In that study by Gepner, et al that I mentioned earlier, the authors tested the rate of alcohol metabolism and found that slow metabolizers had greater glycemic benefit, suggesting that the alcohol effects on liver production of glucose lingered in patients who don't clear alcohol from the system as quickly.¹ Approximately one-third of patients with diabetes in that study were slow metabolizers, so these people may be at higher risk for hypoglycemia, although there haven't been specific studies to evaluate this.

MR. BUSKER: Thank you, Dr. Mathioudakis. I think we've got time for one more patient scenario. So if you would, please ...

DR. MATHIOUDAKIS: This was a 41 year old Caucasian woman whose type 2 diabetes had been diagnosed a year earlier. She was coming in for consultation about her diabetes management and morbid obesity. She had had prediabetes for years before her diagnosis and was treated with metformin, and in October of 2013 she presented with acute hyperglycemia, blood glucoses over 900 mg/dL, and an A1c of 13.6%. She was hospitalized and started on insulin, and she had a workup for type 1 diabetes that proved negative with negative GAD antibodies and a normal C peptide level. At the time of her initial visit she was taking glargine 50 units at night, and insulin aspart, 1 unit per 15 g of carb, so on average 5 to 10 units of aspart with meals.

Her weight was 390 pounds and she had a BMI of 62.3. Despite her weight, her initial A1c was 6.1%, and most of her blood glucose readings were under 120. So her glycemic control wasn't the big problem; the problem was really her obesity, which was something she had struggled with her entire life since second grade. She said she had gained weight throughout middle and high school, and by the time she graduated from high school she weighed 253 pounds. She joined

Weight Watchers and was able to lose about 50 pounds before college, and at the end of college she had gallbladder surgery and was immobile and regained a lot of weight in the post-op period, and then in her 20s and 30s just had steady weight gain.

In her early 30s endometrial cancer was diagnosed, and she weighed 423 pounds. She had surgery for the endometrial cancer, which was complicated by poor wound healing with over a year of an open surgical wound, which will have bearing on some of the discussions that follow. She was seen in an obesity clinic in an outside city and was placed on a calorie restricted liquid diet of 1,200 calories per day. She was able to lose about 110 pounds over several years, down to 352 pounds. Unfortunately, she was unable to sustain this diet because it was very expensive and it was very hard to adhere to such a low calorie intake without continuous and regular support.

MR. BUSKER: So despite being morbidly obese, her diabetes is pretty well controlled. How would you approach a patient like this, whose overriding priority is weight loss?

DR. MATHIOUDAKIS: She was very distraught by her weight, and this had caused depression. She'd been struggling with depression, and I thought given her diabetes and her weight and depression, we want to make sure there is no medical cause for this. We screened her for Cushing's syndrome; that proved negative, and she was found to have normal thyroid function. So our first priority was really to help encourage her to lose weight by reducing her insulin doses. She had a normal A1c, so my initial recommendation was to reduce her bolus insulin to see if we could manage her with a combination of basal insulin and metformin.

I referred her to our registered dietitian, who placed her on a 1,800 calorie diet and suggested that she limit her carbs to 60 grams per meal and her snacks to 15 g to 30 g of carbs. She was advised to limit high fat food and aimed for 150 minutes of moderate intensity exercise per day.

MR. BUSKER: The dietitian put her on an 1,800 to 2,000 calorie a day diet. How was that caloric goal determined?

DR. MATHIOUDAKIS: That's a good question. We know that typically a 500 calorie deficit per day results in a one pound weight loss per week, and most experts recommend weight loss at a rate of about half a pound to a maximum of two pounds per week. Each individual's resting metabolic needs can be determined from an equation that takes into account their baseline weight, their height, and their age. Using that calculator for this patient, her basal metabolic rate would be around 2,450 per day, so a deficit of 500 calories from that would mean approximately 1,900 calories per day, hence the 1,800 to 2,000 calorie range she was given.

With that deficit we would expect her to lose about a pound per week. Generally the ADA recommends women to consume no less than 1,200 calories per day and men no less than 1,500 calories per day, although in supervised settings very low calorie diets may be appropriate for some patients.

In this newsletter issue we reviewed a paper by Rothberg and colleagues, who found that a very low calorie diet was an effective way to promote rapid weight loss in the short term.² But some of the concerns about very low carb, very low calorie diets include fatigue, constipation, nausea, diarrhea, and gallstones, which are particularly problematic with rapid weight loss. There is also a concern that these diets just aren't effective in the long term compared to more modest calorie-restricted diets of 800 to 1,500 calories per day because they're just so hard to sustain.

MR. BUSKER: How did your patient respond to this recommended low calorie diet?

DR. MATHIOUDAKIS: She was actually able to come off of insulin completely over six months, and we transitioned her to metformin alone and the once weekly GLP1 agonist dulaglutide at 1.5 mg weekly. Her A1c readings remained less than 7% during this time. The strange thing was that she did not lose weight and had a slight weight gain after stopping insulin, which is not what we expect, especially in the setting of added GLP1 agonist therapy. Many patients can lose up to 10 pounds on GLP1 agonists.

So given her BMI of 62, we had extensive discussions about bariatric surgery, which I strongly endorsed for her. She was resistant to this idea because she had had several friends who had negative experiences with the procedure — like dumping syndrome, weight regain — and she even knew someone who had died of complications from the surgery. I

presented her with the totality of the evidence which shows that there are significant glycemic benefits with bariatric surgery and relatively low risk of side effects, but one of her main concerns about moving forward with bariatric surgery was the risk of poor wound healing, given her experience with the incision from her endometrial cancer that took up to a year to close.

MR. BUSKER: What caused her poor wound healing? Her obesity, her diabetes, or the combination of both? What are your thoughts here?

DR. MATHIOUDAKIS: Probably both. When she had endometrial surgery 10 years earlier, she wasn't known to be diabetic but was prediabetic, which probably had something to do with it, but I think it's probably all just pannus. She was a really large woman, so it's just hard to get the wounds to close there.

MR. BUSKER: One last question about this patient: you've gotten her off insulin but she's not losing weight, and she's resistant to bariatric surgery. What's your recommendation now?

DR. MATHIOUDAKIS: Her A1c is technically within target, she's developed a lot of complications from obesity, including osteoarthritis of her knee and lymphedema, so every time I see her I continue to advocate bariatric surgery. Since she's resistant to the idea, we've sent her to a weight management center for consideration of the medically supervised, very low calorie diet with meal replacements. We're also considering a trial of the combination of phentermine and topiramate, which has been associated with on average a 10% weight loss, although I think ultimately bariatric surgery would be a more effective long-term solution for her. And I continue to encourage and praise her for her sustained glycemic control despite her weight, but I think she's going to need a lot more support and intervention to start taking some of this weight off.

MR. BUSKER: Thank you for today's cases and discussion, doctor. I think what we've talked about today really reinforces the growing importance of evidence-based diet and weight management for patients with diabetes. Overall, what would improve clinicians' ability to more effectively provide dietary recommendations?

DR. MATHIOUDAKIS: As a physician, it's really hard to keep up with the myriad of diets that are out there. I think it would be helpful for the ADA to not only provide general recommendations about plans, but also provide expert-based ratings of commercially available and medically endorsed diets based on currently available evidence — similar to what the *US News & World Report* diet rankings do for the general population, but focused on glycemic control. And we clearly need additional studies that randomize patients to common diet plans and control for confounding factors like level of physical activity and weight loss, and longer studies to assess sustainability of these different diet programs.

MR. BUSKER: Thank you for sharing your thoughts, Dr. Mathioudakis. Let's wrap things up by reviewing what we've talked about today in light of our learning objectives. So to begin: how to counsel patients about the appropriateness of commercially available and medically endorsed diets for diabetes management?

DR. MATHIOUDAKIS: In considering specific diet types, I think it's important to consider whether the principles of the given diet align with the overall dietary recommendations of the ADA. And while the ADA doesn't provide specific guidance on a single macronutrient composition of the diet, they favor diets that are high in vegetables and fruits and low in saturated fat, with a preference for monounsaturated fats such as olive oil; selection of carbohydrates that are low in glycemic index and high in fiber; and avoidance of added sugar or sugary beverages.

MR. BUSKER: And the effects of alcohol on glycemic control in patients with type 2 diabetes.

DR. MATHIOUDAKIS: Alcohol intake may lower fasting blood glucose by affecting insulin sensitivity, and evidence from a meta-analysis shows that women may be particularly susceptible to changes in insulin sensitivity. But the ADA does not recommend initiating alcohol for patients if they don't already consume it on a regular basis.

MR. BUSKER: And finally, the advantages and disadvantages of very low calorie diets for weight loss.

DR. MATHIOUDAKIS: Very low calorie diets may be an effective option for morbidly obese patients with type 2 diabetes, but they should be done under medical supervision because of the potential for side effects, including fatigue, constipation, nausea, diarrhea, and gallstones.

MR. BUSKER: Dr. Nestoras Mathioudakis from the Johns Hopkins University School of Medicine, thank you for participating in this eDiabetes Review Podcast.

DR. MATHIOUDAKIS: It's been great talking with you, Bob. Thanks for having me again.

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1. Gepner Y, Golan R, Harman-Boehm I, et al. [Effects of Initiating Moderate Alcohol Intake on Cardiometabolic Risk in Adults With Type 2 Diabetes: A 2-Year Randomized, Controlled Trial](#). *Ann Intern Med*. 2015 Oct 20;163(8):569-79.
2. Rothberg AE, McEwen LN, Kraftson AT, Fowler CE, Herman WH. [Very-low-energy diet for type 2 diabetes: an underutilized therapy?](#) *J Diabetes Complications*. 2014 Jul-Aug;28(4):506-510.

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This activity was developed in collaboration with DKBmed.