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What to do when doctors disagree on diets for women with gestational diabetes
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Abstract:	Medical Nutrition Therapy is considered the cornerstone of treatment for Gestational Diabetes (GDM) even though there is no consensus on the best dietary approach to achieve optimal glycemic control and positive maternal and fetal outcomes. In this article, we present a case from our clinic of a woman with gestational mellitus, the evidence for the level of macronutrients to include in the diet as well as the use of Glycemic Index for dietary planning. We also review the evidence for emerging dietary therapies and provide general recommendations that should be individualized to the patient.

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Table 4. Cochrane Review 2017: Different Types of Dietary Advice for Women with Gestational Diabetes Mellitus and Outcomes

Diet	Studies	N	Interventional outcomes (no clear differences in primary outcomes except DASH reported separately) Secondary outcomes	Country
Low-moderate Glycemic Index vs moderate to high Glycemic Index	4	224	Possible benefit for glycemic control (lower end of intervention 2 hr. post prandial glucose) for women in low/moderate GI group (one trial 83 women)	Australia, Canada, China and Mexico
Energy restricted vs no energy-restriction	3	437	More neonatal hypocalcemia in the energy restricted group (1 trial 299 infants); possible benefits for glycemic control (lower end of intervention fasting glucose, 24-hr mean plasma glucose, and 1-hr post prandial glucose) for energy-restricted group (2 trials 311 women)	Australia, Canada, US
DASH diet vs diet with matching macronutrients	3	136	Fewer macrosomic babies in DASH group, lower ponderal indices, lower birthweights (2 trials 86 infants); lower use of additional pharmacotherapy (2 trials 86 women) possible benefits for insulin sensitivity with lower end of intervention homeostatic model assessment of insulin resistance and blood insulin levels (1 trial 32 women); glycemic control (end of intervention fasting glucose) (2 trials 66 women)	Iran
Low carb vs high carb diet	2	182	Less gestational weight gain in lower carb group (1 trial 66 women)	Spain, Poland
High unsaturated fat vs low unsaturated fat	2	111	High unsaturated fat diet higher BMI at 5-9 months postpartum (1 trial 27 women) with less favorable insulin sensitivity with higher 38-week insulin levels (1 trial 24 women); less favorable glycemic control at 38 weeks (fasting, postprandial and HbA1c) (1 trial 25 women)	China, Denmark
Low GI vs high fiber moderate GI	1	99	No clear differences (one trial)	Australia
Diet + behavior advice vs diet only	1	200	Women receiving additional diet and related behavior advice experienced possible glycemic benefit: (lower end of intervention fasting plasma glucose) (one trial)	Italy
Soy protein enriched vs no soy protein diet	1	69	Fewer babies in soy enriched diet group developed hyperbilirubinemia (one trial 68 infants) possible benefits in glycemic control in soy enriched diet group, plasma glucose (one trial 69 women)	Iran
High fiber vs standard fiber	1	22	No clear differences (1 trial)	US
Ethnic Specific vs standard healthy diet	1	20	No clear differences (1 trial)	Italy

Abstract

Medical Nutrition Therapy is considered the cornerstone of treatment for Gestational Diabetes (GDM) even though there is no consensus on the best dietary approach to achieve optimal glycemic control and positive maternal and fetal outcomes. In this article, we present a case from our clinic of a woman with gestational mellitus, the evidence for the level of macronutrients to include in the diet as well as the use of Glycemic Index for dietary planning. We also review the evidence for emerging dietary therapies and provide general recommendations that should be individualized to the patient.

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4 What to do when doctors disagree on diets for women with gestational diabetes
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4 **ABSTRACT**

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6 Medical Nutrition Therapy is considered the cornerstone of treatment for Gestational Diabetes (GDM)
7 even though there is no consensus on the best dietary approach to achieve optimal glycemic control and
8 positive maternal and fetal outcomes. In this article, we present a case from our clinic of a woman with
9 gestational mellitus, the evidence for the level of macronutrients to include in the diet as well as the use of
10 Glycemic Index for dietary planning. We also review the evidence for emerging dietary therapies and
11 provide general recommendations that should be individualized to the patient.
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24 **INTRODUCTION**

25
26 Gestational diabetes mellitus (GDM) is diabetes diagnosed in 2nd or 3rd trimester of pregnancy
27 that is clearly not Type 1 or Type 2 (1). It has been associated with complications during and
28 after pregnancy. Additionally, it is a risk factor for developing GDM in subsequent pregnancies
29 or Type 2 diabetes mellitus (T2DM) in the future. The key strategies for prevention and reduced
30 risk of complications from GDM include 1) achieving and maintaining optimal glycemic
31 control during pregnancy; 2) consuming a carbohydrate controlled meal plan with adequate
32 nutrient content to support maternal needs and fetal growth that has been individualized by a
33 Registered Dietitian Nutritionist (RDN); 3) gaining weight according to the Institute of Medicine
34 Guidelines; 4) increasing physical activity; and 5) using medications if unable to achieve
35 glycemic control with lifestyle management alone (1-8). The conventional dietary approach of
36 restricting carbohydrates to 30-40% of calories has been challenged but because of limited
37 evidence there is no consensus on which dietary approach, especially related to the type and
38 amount of carbohydrate leads to the optimal outcomes (9-11). There is agreement that it is
39 critical for the woman to keep her blood glucose level under control to minimize the
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1 Gestational Diabetes 3

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4 complications to mother and infant. The primary outcomes studied related to different types of
5 dietary advice for mother and infant are listed in Table 1 (11).
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11 A 2017 Cochrane (11) review identified 10 different types of advice including but not limited to
12 the levels of carbohydrate (CHO) and use of the Glycemic Index (GI) to manage blood glucose
13 levels. In 2017 the American College of Obstetrics and Gynecology (2) updated its Practice
14 Bulletin to present management guidelines that have been validated by appropriately conducted
15 clinical research. In this article, we focus on the evidence for the level of CHO to include in the
16 diet as well as the use of GI for planning a diet for a woman with GDM. We present a case from
17 our clinic of a woman with GDM and the type of advice she received from her clinician as well
18 as her diet and exercise plan could have been individualized in collaboration with a Registered
19 Dietitian Nutritionist (RDN) and we make suggestions for individualizing nutritional care.
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38 **CASE PRESENTATION**

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40 Ms. JC. is a 31-year-old woman with morbid obesity who has had 6 previous pregnancies and 2
41 live births. Her first birth was complicated by a vacuum assisted vaginal delivery, shoulder
42 dystocia, and fourth degree perineal laceration. Her second birth was an uncomplicated
43 spontaneous vaginal delivery. She did not have GDM in either of these full-term pregnancies.
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51 Pre-pregnancy, J.C. was measured at 60 inches tall and 241 pounds (BMI = 48). The clinic uses a
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4 Table 3 has the values from her follow-up 3-hour OGTT which was abnormal. Her physician
5 counseled her on the meaning of the results and the risks to herself and her baby if she did not
6 manage her blood sugar. She was given brief counseling on a diet and physical activity for
7 diabetes management as outlined in the prenatal education book given to all our pregnant
8 patients (Figure 1). She was instructed in home glucose monitoring with pregnancy goals of
9 fasting <90 mg/dL and 2-hour postprandial <120 mg/dL; and weight maintenance. At the time
10 of her diagnosis, she had gained 23 pounds, which exceeded the goal of 11-20 pounds explained
11 to her at an earlier visit (7).
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14 In follow-up, 2 weeks later, Ms. J.C. presented with a blood glucose but not a diet log. She
15 reported checking her blood glucose levels six times a day. All fasting blood glucose levels were
16 above the recommendation at 106 mg/dL to 198 mg/dL and postprandial levels were mostly
17 higher than recommended at 101 mg/dL to 190 mg/dL. She said she liked fruits and vegetables
18 but had a hard time getting them. She stated she was taking a prescription prenatal vitamin
19 mineral supplement. Because her blood glucose was elevated she was advised to take
20 Metformin XR at a dosage of 500 mg twice a day and continue reminded to eat three balanced
21 meals a day plus snacks between meals and avoid foods with lots of sugar in them and be
22 physically active.
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25 In follow-up one week later she presented with no logs but verbally reported her fasting blood
26 sugars were in the 100 mg/dL to 120s mg/dLs range and her postprandial blood sugars were in
27 the 120s mg/dLs . She stated she took the Metformin only once because she did not like the way
28 it made her feel. She was referred for Medical Nutrition Therapy (MNT) but did not keep her
29 appointment.
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1 Gestational Diabetes 5

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4 Ms. JC's past medical history includes morbid obesity, depression with anxiety, and tobacco use.
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7 Her pertinent social history includes full time employment at a social service agency and being a
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9 single mother. She missed many of her prenatal appointments due to her work and parenting
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11 schedules, and she was seen multiple times in labor and delivery triage for musculoskeletal
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13 concerns. She was transferred to a regional high risk obstetrical clinic for antepartum fetal
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15 surveillance at 32 weeks and admitted at 36 weeks for inpatient monitoring due to non-reassuring
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17 fetal testing. Her labor was induced at 37 weeks due to poorly controlled GDM despite medical
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19 management and associated maternal and fetal risks. She has not yet followed up for postpartum
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21 care or a 2-hour glucose tolerance test recommended to diagnose persistent Type 2 diabetes at 6
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23 weeks post-partum.
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31 **EVIDENCE TO GUIDE DIETARY PLANNING**

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36 The conventional diet approach for managing GDM has been carbohydrate restriction (30-40%
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38 energy from total calories) which usually resulted in a higher fat content. There is emerging
39
40 evidence that a diet higher in nutrient dense carbohydrates may result in better outcomes. There
41
42 is the suggestion, as well, that using the glycemic index (GI) of foods to plan diets may result in
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44 better glucose management. Physicians, nurse midwives and RDNs are all challenged to advise
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46 women on the optimal approach for managing their blood glucose levels (9-10).
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53 **What the experts, textbooks and manuals now recommend.**

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55 **Expert recommendations.** Lifestyle management including diet, appropriate weight gain and
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57 physical activity are considered essential components of controlling GDM (1-8). The 2018 ADA
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59 Standards of Care (1) states MNT for GDM is an individualized nutrition plan developed
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1 Gestational Diabetes 6
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4 between the patient and the RDN familiar with the management of GDM and does not specify
5 the optimal amount and type of carbohydrates (CHO). They recommend relying on guidance
6 from the Dietary Reference Intakes (DRI) which is a minimum of 175 grams of CHO, a
7 minimum of 71 grams protein, and 28 grams of dietary fiber. The ACOG Practice Bulletin (2)
8 continues to specify the percentage of CHO be limited to 33-40% of calories, with the remaining
9 calories divided between protein (20%) and fat (40%). In its 2014 practice paper, the Academy
10 of Nutrition, and Dietetics (3) stated that for women with GDM, improved outcomes are
11 observed with dietary intake limiting carbohydrates to 45% of energy but further research is
12 needed regarding goals for protein, fat, fiber, and energy.
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26 **Textbook descriptions of lifestyle management for GDM.** Hackey & Moore's Essentials of
27 Obstetrics and Gynecology (6) describes a diet that has 45-50% of its calories from CHO (with
28 lots of fiber), 20-25% from protein, and 20-25% fat. The caloric requirement is calculated on the
29 basis of ideal body weight and distributed throughout the day (20% at breakfast and bedtime
30 snack each; and 30% at lunch and dinner each). In one on-line clinical reference tool used by
31 physicians (5), CHO is described as the primary nutrient affecting postprandial glucose levels
32 should be limited to 40% calories while ensuring that ketonuria does not ensue. In a highly
33 regarded nutrition textbook (8) MNT a CHO controlled meal plan with optimal nutrition,
34 adequate energy for appropriate weight gain and achievement and maintenance of
35 normoglycemia without ketosis are regarded as the cornerstone of treatment for GDM. This text
36 notes the traditional approach has limited CHO to 30-40% of energy but viable alternatives
37 including use of foods with low GI exist. The online Nutrition Care Manual used by RDN's (4)
38 recommends a diet with a minimum of 175 grams of carbohydrate per day to provide glucose for
39 the fetal brain and prevent ketosis.
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4 **Observations by clinicians in practice.** Some physicians observe that women who consume
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6 Ready-to-Eat processed cereal, fruit juices, instant products and other highly refined products
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8 have higher postprandial blood glucose levels than those who eat less refined products and whole
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10 fruit. They recommend their patients consume unrefined, whole-grain breads, old-fashioned
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12 oatmeal, nuts, legumes and lentils because these foods appear to have a lower glycemic response
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16 (9,11).
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21 **What the research studies demonstrate**

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26 **Ten dietary treatments presented in a 2017 Cochrane review.** Table 4 lists 19 trials of
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28 different types of dietary advice given to women with GDM, the number, size and location of the
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30 studies, outcomes from the intervention (12). Recognizing the current evidence is very limited,
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32 the authors concluded that there were no clear differences in outcomes, except for a possible
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34 reduction in caesarean section for women receiving a DASH diet as compared to a control diet.
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41 **Additional Dietary Studies.** There are several studies published since the Cochrane review
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43 that merit a brief discussion. There is continued interest in the use of GI to plan meals. In four
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45 of the studies included in the Cochrane review (12), especially those from Australia noted
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47 possible benefit from using a diet with low or moderate GI. It should be noted that consumers in
48
49 Australia have less access to information about the nutrient content, including carbohydrates, of
50
51 their food as they do not have Nutrition Facts labeling like the U.S. Women participating in a
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53 small Australian study were provided all their meals and experienced reduced diurnal glycemic
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55 oscillations. The glycemic load (GL) was calculated by a dietitian and the women experienced
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57 50% lower glucose levels, increased time within target range, and less glycemic variability than
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4 the conventional diet (13). This suggests that improvement in glycemic control may be obtained
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7 by changing the type of CHO rather than by decreasing CHO.
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11 In a retrospective cohort study of 436 women, there appeared to be a dose response relationship
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13 and less macrosomia for the infants of women receiving MNT (14). Unfortunately, no details of
14
15 the type of diet were included in the report. In two additional small studies where the food was
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17 provided to the women, the diet was liberalized to as high as 50-60% of the calories from more
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19 complex CHOs and less fat. The question studied was “would a high complex CHO, lower fat
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21 diet improves maternal insulin resistance and infant adiposity”. This trial, referred to as
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23 CHOICE did result in women achieving glycemic control (11, 15).
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31 **Other strategies studied.** Researchers have studied the impact of a variety of nutrients and
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33 dietary strategies on prevention and management of GDM not included in the Cochrane review
34
35 (12) including Vitamin D alone and in combination with calcium supplementation, fish oil,
36
37 primrose oil or linoleic acid and gamma linolenic acid, magnesium and zinc supplementation,
38
39 and dietary bioactive compounds like flavonoids and polyunsaturated fatty acids. Perhaps the
40
41 most interesting alternative therapies is the use of probiotics. Researchers are investigating the
42
43 role of gut microbiome as a modulator of metabolic and inflammatory processes. A wide variety
44
45 of bacteria have been studied in a limited way with findings ranging from no effect to potential
46
47 positive effects on macrosomia, appropriate weight gain, reduced fasting blood glucose,
48
49 decreased insulin resistance, and decrease in serum insulin. A 2014 Cochrane Review identified
50
51 a single high-quality trial showing a reduction in rate of GDM among women randomized to
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53 probiotics early in pregnancy (17). Currently the optimal dose, ideal bacterial composition, and
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55 safety are unknown (17).
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7 One study focused not on the composition of the diet itself but the stress and anxiety women
8 with GDM experience. More than half of the 30 women participating struggled with dietary
9 management between 33 and 37 weeks gestation with significantly higher stress scores noted
10 among participants requiring insulin therapy. The authors suggested that tailored care plans and
11 strong communication between the patient and the entire health team may help decrease dietary
12 management stress (18).
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26 **Finding the Balance.** MNT is considered the cornerstone of treatment for GDM. Women who
27 only receive general dietary advice like that listed in Figure 1 are less likely to achieve glycemic
28 control than women who receive tailored MNT from a RDN. Table 5 summarizes the approach
29 we recommend to the teams in our clinic who provide care for women with GDM. Since the
30 stress associated with the diagnosis of GDM can be reduced if all providers help the women
31 improve their diabetes self-management behaviors including a diet, physical activity and self-
32 monitoring plan tailored to the patient's life circumstances. Additionally, strong communication
33 between the health care team and the woman is critical. Based on our review of the evidence we
34 compiled the messages we would like our team to give consistently (Table 4). We encourage the
35 RDNs who provide care to women with GDM proactively reach out to the physicians and other
36 team members to provide this advice until further research warrants a change in approach.
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53 **Changing the form of CHO.** While the research suggests that improvement in glycemic
54 control might be obtained by changing the form of carbohydrate rather than decreasing the
55 amount consumed (13) many of the foods and beverages consumed by patients in the studies
56 testing a low Glycemic Index diet are neither physically nor culturally available to the women in
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1 Gestational Diabetes 10

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4 our clinic. Therefore we do not routinely use the Glycemic Index or Glycemic Load for meal
5
6
7 planning. For the rare woman who asks, we can provide the international table of glycemic
8
9 index and glycemic load values (www.glycemicindex.com) but caution the woman that a single
10
11 food can have a range in GI values making it difficult to determine the impact on glycemic
12
13 control without closely monitoring their blood glucose levels. To individualize the diet using
14
15 this approach would require the RDN and the woman with GDM to evaluate the glycemic
16
17 response to foods, at different times of the day and in different combinations of food (14).
18
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23
24 There may be women who are able to eat a sufficiently high enough complex CHO and low-fat
25
26 diet to achieve glycemic control (9). Some clinicians report that their patients respond positively
27
28 to the message to eat more “brown than white” cereals, breads, and grains rather than a message
29
30 to eat complex CHO or whole grains.
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36 **Case Revisited**
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39
40 The guidelines for physicians managing women with GDM all recommend that they refer the
41
42 patient to a RDN for individualized MNT. But with the conventional approach being challenged,
43
44 how should the RDN proceed? Ms. J.C.’s management of her GDM was not optimal. The
45
46 following describes how we may have approached her case for diet and physical activity
47
48 counseling.
49
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54
55 **Initial visit with RDN.** This visit ideally would have occurred before Ms. J.C. was diagnosed
56
57 with GDM. She is at high risk for GDM due to her pregnancy outcome history and obesity
58
59 making it important for the RDN to begin counseling her early in her pregnancy. Where
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1 Gestational Diabetes 11

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3
4 possible to reduce the risk of a woman not keeping a referral appointment for MNT, providing
5
6 these services during the scheduled prenatal visit would be optimal. If the Ms. J.C. had kept her
7
8 appointment(s) with the RDN, the following assessment and counseling would have occurred.
9

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13
14 In the initial visit the RDN would conduct a full nutritional assessment utilizing the Nutrition
15
16 Care Process (www.andean.org/ncp). The RDN would assess the patient's learning needs,
17
18 willingness, and ability to make changes as well as cultural and food preferences that may affect
19
20 adherence to a meal plan. The initial assessment would include J.C.'s usual intake of food and
21
22 beverages, including amounts and variety consumed. During this assessment J.C. would be
23
24 screened for food insecurity and linked to local resources as needed (20). It should be noted that
25
26 Ms. J.C. was not food insecure at the time of this pregnancy, however she indicated there have
27
28 been times when the food she bought just didn't last and she didn't have the money to get more,
29
30 suggesting referral for assistance from local resources is important (20).
31
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39 At this visit the RDN would calculate Ms. J.C.'s caloric needs using an acceptable formula for
40
41 an ambulatory patient. Using the AND Nutrition Care Manual (4) interactive calculator and the
42
43 Mifflin St. Jeor formula for patients with obesity, an estimate of 1,733 calories was made. Ms.
44
45 J.C. is sedentary and in her first trimester of pregnancy, so no additional calories were added.
46
47 An additional 340 calories for the 2nd and an additional 452 calories for 3rd trimester would be
48
49 added per day to meet pregnancy needs. The calorie level of the meal plan should be
50
51 individualized based on the 1) Assessment; 2) Pre-pregnancy body mass index; 3) Physical
52
53 activity level; and 4) Pregnancy weight gain to date. The RDN would be sensitive to how much
54
55 information Ms. J.C. could use at this visit. The RDN would calculate and document the caloric
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1 Gestational Diabetes 12

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4 goal in her chart but might focus the discussion on portion sizes of CHO foods. The RDN would
5
6
7 reinforce the physician's counseling on appropriate weight gain.
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10
11 Ms. J.C. would be counseled that more than one visit is needed to learn about the best diet and
12
13 physical activity plan for her. On this visit should would be counseled on the importance of
14
15 avoidance of sugar sweetened beverages as well as sugary foods, fruit juices and desserts and the
16
17 impact of these foods on weight gain. She would be encouraged to consume appropriate
18
19 amounts of fruits, vegetables, whole grains, low fat dairy and to choose lean meals and lower fat
20
21 cooking methods. She would also be instructed in food safety practices.
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28 The RDN would assess her health literacy and at this visit select a diet plan that would not
29
30 overwhelm the patient. In this case the RDN might use the Idaho Plate method found at
31
32 <http://www.platemethod.com>. For other women, the RDN might tailor the plan generated for
33
34 the pregnant patient at www.supertracker.usda.gov to the woman's preferences and budget.
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37

38 Figure 2 is an example of MyPlan for a pregnant woman from the Supertracker site. If time
39
40 allowed, a review of how to use the Nutrition Facts Label for portion size and calorie content
41
42 would be done. The RDN would reinforce the physical activity plan the physician recommended
43
44 which was to spend 30 minutes a day walking to the park or playing with her children. At later
45
46 visits the RDN would work with the Ms. J.C. to work toward meeting the current
47
48 recommendation for physical activity of 30 min moderate intensity aerobic exercise at least 5
49
50 days a week or a minimum of 150 minutes per week (1-2). At the end of the visit, Ms. J.C. would
51
52 be assisted in setting a SMART Goal—a goal that is Specific, Measurable, Attainable, Realistic,
53
54 and Timely / Trackable (21).
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1 Gestational Diabetes 13

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4 **Follow up visits with RDN after diagnosis of GDM.** When Ms. J.C. was diagnosed with
5
6 GDM, she would have additional visits with the RDN. The Gestational Diabetes Evidence-
7
8 Based Nutrition Practice Guideline (22) suggests a minimum of three encounters with an RDN
9
10 for self-management education. It notes a phone encounter supplemented with food and blood
11
12 glucose records obtained via fax or email may be an option. Additionally, it recommends a
13
14 follow-up visit after delivery focusing on lifestyle modifications aimed at reducing weight and
15
16 increasing physical activity, as GDM is a risk factor for subsequent T2DM.
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23 The RDN would again review the importance of avoidance of sugar sweetened beverages and
24
25 sugary foods and desserts and their impact on blood glucose levels. Ms. J.C. would be taught to
26
27 monitor blood glucose levels at home, record results, recognize if she was not achieving her
28
29 goals and when to call her physician. She would be counseled on eating smaller portions of CHO
30
31 at meals and spreading intake through the day (in 3 meals and 2-3 snacks) rather than limiting or
32
33 eliminating CHO from the diet.
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40 On follow up in 2 weeks, the RDN would assess J.C.'s CHO intake and blood glucose levels and
41
42 based on those assessments may instruct her on goals for carbs at each meal. An initial goal
43
44 would be at least 175 grams CHO per day, spread through smaller meals and portions. For the
45
46 patient who desires more detailed guidance, the RDN might suggest a goal of 15 to 30 grams of
47
48 CHO at breakfast if the 2-hour prandial blood glucose level is elevated. Reasonable meal and
49
50 snack goals would be 45-60 grams of CHO at meals and 15-30 grams of CHO at snacks. Again,
51
52 these would be individualized based on the patient's blood glucose log, personal preferences,
53
54 CHO intake, and nutritional adequacy of the diet. If goals cannot be met with diet changes the
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1 Gestational Diabetes 14

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4 RDN would contact the physician and inform him/her of the current findings and potentially try
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6
7 using a different approach to CHO control.
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11 Ms. J.C. would have additional visits supplemented with phone encounters with the RDN to
12
13 support her in self-management and make adjustments as needed. She would be counseled about
14
15 her risk for T2DM post-partum and scheduled to return for MNT several weeks after delivery.
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26 **SUMMARY**
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31 While lifestyle is considered the cornerstone of prevention and management of GDM the optimal
32
33 diet for glycemic control has received little study. RDNs are aware of the controversies
34
35 surrounding the composition, quality, and quantity of CHO in the diet recommended to women
36
37 with GDM. RDNs should take leadership for outlining evidence-based strategies to achieve
38
39 glycemic control with diet and physical activity for the team managing women with GDM. The
40
41 team should provide consistent messages to the woman. The RDN should individualize the diet
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43 approach to the patient's interest, ability to follow and response to the diet to reduce the risks for
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45 poor outcomes for herself and her infant.
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17 literature search and review of the manuscript.
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26 Figure 1. Typical advice to patient about GDM.
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28 Figure 2. Example of MyPlan for a pregnant woman from www.supertracker.usda.gov
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31 Table 1. Different types of dietary advice for women with GDM: primary outcomes (11).
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33 Table 2. Results of Ms. J.C.'s 1 hour screening lab test
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36 Table 3. Results of Ms. J.C.'s 3-hour OGTT.
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38 Table 4. Cochrane Review 2017: Different Types of Dietary Advice for Women with GDM and
39 outcomes
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43 Table 5. Recommendations to physicians for the dietary and physical activity management of
44 GDM
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50 Call outs:
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- 55 • The conventional dietary approach of restricting carbohydrates to 30-40% of calories has
56 been challenged.
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1 Gestational Diabetes 19
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- 4 • Her labor was induced at 37 weeks due to poorly controlled GDM despite medical
5 management
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9
- 10 • Lifestyle management including diet, appropriate weight gain and physical activity are
11 considered essential components of controlling GDM
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- 16 • . Table 4 lists 19 trials of different types of dietary advice given to women with GDM,
17 the number, size and location of the studies, outcomes from the intervention. Researchers
18 have studied the impact of a variety of nutrients and dietary strategies on prevention and
19 management of GDM not included in the Cochrane review (12) including Vitamin D
20 alone and in combination with calcium supplementation, fish oil, primrose oil or linoleic
21 acid and gamma linolenic acid, magnesium and zinc supplementation, and dietary
22 bioactive compounds like flavonoids and polyunsaturated fatty acids.
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- 34 • We encourage the RDNs who provide care to women with GDM proactively reach out to
35 the physicians and other team members to provide this advice until further research
36 warrants a change in approach
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- 43 • the RDN might suggest a goal of 15 to 30 grams of CHO at breakfast if the 2-hour
44 prandial blood glucose level is elevated. Reasonable meal and snack goals would be 45-
45 60 grams of CHO at meals and 15-30 grams of CHO at snacks. Again, these would be
46 individualized based on the patient's blood glucose log
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- Kathryn M Kolasa PhD, RDN, LDN is professor Emeritus, Brody School of Medicine at East Carolina University, Greenville, NC and contributing editor, Nutrition Today

February 3, 2018

Dear Dr. Dwyer

Please find our manuscript entitled: What do I tell my patient when there's no consensus on the best diet for women with gestational diabetes? co-authored by Kay Craven MPH, RDN, CDE, Director nutrition services ECU Physicians, Kelley Haven MD, Assistant Professor, Department of Family Medicine, East Carolina University and Kathryn M. Kolasa, PhD, RDN, Professor Emeritus, Brody School of Medicine at East Carolina University.

None of us have a conflict of interest

As you know, we discussed this topic with you. The three co-authors presented this topic at ECU Family Medicine's Gran Rounds in December 2017 and received excellent reviews. You had indicated, especially in view of the challenges to conventional wisdom about what diet is appropriate for women with GDM, it was time to revisit this topic in the journal

We hope you will find this acceptable for publication in Nutrition Today. We believe this paper is of interest to dietitians, dietetic educators and nurses and other allied health professionals who provide care to women with gestational diabetes as well as educators to teach about pregnancy and nutrition. s.

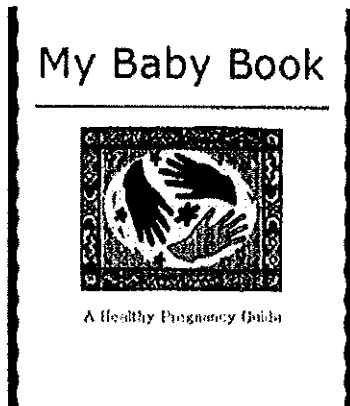
We did include two tables (laboratory values) and one figure (Supertracker pregnancy plan) that can be replaced with text if you prefer. We sent you a note about that but you may have been on vacation.

Thank you for your consideration.

Cordially

Kathryn M. Kolasa PhD, RDN, LDN

FIGURE 1. BABY BOOK GIVEN TO PATIENTS



Under Routine Prenatal Laboratory studies: Diabetes screen (Glycolg): test done at the first prenatal visit in women with risk factors for pre-existing diabetes or the development of gestational diabetes. All women will be screened later in pregnancy

A definition of gestational diabetes





What will the doctor do.... You will talk with the nutritionist, who can help you plan your diet.

Diet for Gestational Diabetes: "It is very important that you eat three balanced meals a day PLUS snacks between meals. Your nutritionist will design an individual meal plan for you."

What you can do:



- Follow the diet the doctor or nutritionist give you
- Do not eat foods that have a lot of sugar in them such as cookies, candy or ice cream, soda, and juice
- Eat healthy snacks in between meals
- Do not skip meals
- Stay active

Figure

<p>Fruits</p> 	<p>2 cup(s) per day</p>	<p>1 cup of Fruit:</p> <ul style="list-style-type: none"> • 1 cup raw or cooked fruit • 1 cup 100% fruit juice • ½ cup dried fruit <p>See more Fruit examples</p>	<p>Tips</p> <ul style="list-style-type: none"> • Select fresh, frozen, canned, and dried fruit more often than juice, select 100% fruit juice when choosing juice. • Enjoy a wide variety of fruits, and maximize taste and freshness, by adapting your choices to what's in season. • Use fruit as snacks, salads, or desserts.
<p>Dairy</p> 	<p>3 cup(s) per day</p>	<p>1 cup of Dairy:</p> <ul style="list-style-type: none"> • 1 cup milk • 1 cup fortified soy milk (soy beverage) • 1 cup yogurt • 1½ ounces natural cheese (e.g. Cheddar) • 2 ounces processed cheese (e.g. American) <p>See more Dairy examples</p>	<p>Tips</p> <ul style="list-style-type: none"> • Drink fat-free (skim) or low-fat (1%) milk. • Choose fat-free or low-fat milk or yogurt more often than cheese. • When selecting cheese, choose low-fat or reduced-fat versions.
<p>Protein Foods</p> <ul style="list-style-type: none"> • Seafood 	<p>6½ ounce(s) per day</p> <ul style="list-style-type: none"> • 10 ounce(s) per week 	<p>1 ounce of Protein Foods:</p> <ul style="list-style-type: none"> • 1 ounce lean meat, poultry, seafood • 1 egg • 1 Tablespoon peanut butter • ½ ounce nuts or seeds • ¼ cup cooked beans or peas <p>See more Protein Food examples</p>	<p>Tips</p> <ul style="list-style-type: none"> • Eat a variety of foods from the Protein Foods group each week. • Eat seafood in place of meat or poultry twice a week. • Select lean meat and poultry. Trim or drain fat from meat and remove poultry skin.
<p>Oils</p> 	<p>5 1/2 Tbsp (102 g)</p>	<p>1 Tbsp of Oil:</p> <ul style="list-style-type: none"> • 1 tsp. vegetable oil (e.g. canola, corn, olive, soybean) • 1½ tsp. mayonnaise • 2 tsp. tub margarine • 2 tsp. French dressing <p>See more Oil examples</p>	<p>Tips</p> <ul style="list-style-type: none"> • Choose soft margarine with zero trans fats made from liquid vegetable oil, rather than stick margarine or butter. • Use vegetable oils (olive, canola, corn, soybean, peanut, safflower, sunflower) rather than solid fats (butter, shortening). • Replace solid fats with oils, rather than adding oil to the diet. Oils are a concentrated source of Calories, so use oils in small amounts.

Kathryn's Plan

Your plan is based on a 2400 Calorie allowance during your 2nd trimester of pregnancy.

Calories		Allowance	
Total Calories		2400 per day	
Food Group	Food Group Amount	"What counts as..."	Tips
Grains	8 ounce(s) per day	1 ounce of Grains	Tips
<ul style="list-style-type: none"> Whole Grains 	<ul style="list-style-type: none"> ≥ 4 ounce(s) per day 	<ul style="list-style-type: none"> 1 slice of bread (1 ounce) ½ cup cooked pasta, rice, or cereal 1 ounce uncooked pasta or rice 1 tortilla (6 inch diameter) 1 pancake (5 inch diameter) 1 ounce ready-to-eat cereal (about 1 cup cereal flakes) <p>See more Grain examples</p>	<ul style="list-style-type: none"> Eat at least half of all grains as whole grains Substitute whole-grain choices for refined grains in breakfast cereals, breads, crackers, rice, and pasta Check product labels – is a grain with "whole" before its name listed first on the ingredients list?
Vegetables	3 cup(s) per day	1 cup of Vegetables:	Tips
<ul style="list-style-type: none"> Dark Green Red & Orange Beans & Peas Starchy Other 	<ul style="list-style-type: none"> 2 cup(s) per week 6 cup(s) per week 2 cup(s) per week 6 cup(s) per week 5 cup(s) per week 	<ul style="list-style-type: none"> 1 cup raw or cooked vegetables 1 cup 100% vegetable juice 2 cups leafy salad greens <p>See more Vegetable examples</p>	<ul style="list-style-type: none"> Include vegetables in meals and in snacks. Fresh, frozen, and canned vegetables all count Add dark-green, red, and orange vegetables to main and side dishes. Use dark leafy greens to make salads. Beans and peas are a great source of fiber. Add beans or peas to salads, soups, side dishes, or serve as a main dish.

Call outs:

- The conventional dietary approach of restricting carbohydrates to 30-40% of calories has been challenged.
- Her labor was induced at 37 weeks due to poorly controlled GDM despite medical management
- Lifestyle management including diet, appropriate weight gain and physical activity are considered essential components of controlling GDM
- Table 4 lists 19 trials of different types of dietary advice given to women with GDM, the number, size and location of the studies, outcomes from the intervention. Researchers have studied the impact of a variety of nutrients and dietary strategies on prevention and management of GDM not included in the Cochrane review (12) including Vitamin D alone and in combination with calcium supplementation, fish oil, primrose oil or linoleic acid and gamma linolenic acid, magnesium and zinc supplementation, and dietary bioactive compounds like flavonoids and polyunsaturated fatty acids.
- We encourage the RDNs who provide care to women with GDM proactively reach out to the physicians and other team members to provide this advice until further research warrants a change in approach
- the RDN might suggest a goal of 15 to 30 grams of CHO at breakfast if the 2-hour prandial blood glucose level is elevated. Reasonable meal and snack goals would be 45-60 grams of CHO at meals and 15-30 grams of CHO at snacks. Again, these would be individualized based on the patient's blood glucose log

Table 1. Different Types of Dietary Advice for Women with Gestational Diabetes Mellitus: Primary Outcomes (11)

Fetal/Neonatal/Childhood Primary Outcomes	Maternal Primary Outcomes
<p>Large-for-gestational age (birthweight greater than or equal to the 90th percentile for gestational age)</p>	<p>Hypertensive disorders of pregnancy (including pre-eclampsia, pregnancy-induced hypertension, eclampsia)</p>
<p>Perinatal mortality (stillbirth and neonatal mortality)</p>	<p>Caesarean section</p>
<p>Neonatal mortality or morbidity composite Neurosensory disability</p>	<p>Type 2 diabetes mellitus</p>

Table 5. Recommendations to physicians for the dietary and physical activity management of GDM

Refer to women with GDM to a RDN for individualized MNT

Provide consistent advice to patients from all team members

Strongly recommend avoidance of beverages containing sugar and sweets/desserts

Encourage consumption of a diet rich in non-starchy vegetables, whole or canned/frozen unsweetened fruits, and whole grains, low-fat dairy or diet similar to Dietary Approaches to Stop Hypertension (DASH)

Provide guidance on serving size of foods high in carbohydrates

Encourage 3 meals and 2-3 snacks with carbohydrates spread in smaller amounts through out the day

Recommend no less than 175 g carb per day (RDA for pregnancy)

Breakfast: 15 to 30 g carbohydrate

Lunch and dinner: 45 to 60 g carbohydrate

Snacks: 15 to 30 g carbohydrate

Encourage low fat cooking methods and lean meats

Unless a woman asks and has the interest and resources to pursue, do not recommend using the Glycemic Index approach to meal planning

Unless the woman asks and has the resources to purchase, do not recommend probiotics, and dietary supplements. If recommending provide specific product information.

Provide counseling on exercise which would optimally be 30 minutes of moderate intensity aerobic exercise at least 5 days a week or a minimum of 150 minutes per week. Tailor to the patient's ability.
