



# SWEET SUCCESS: DIABETES AND PREGNANCY NEWSLETTER

## CDAPP Regional Programs



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### *Fetal Programming and Re-Programming*

*Leona Dang-Kilduff, RN, MSN, CDE, Region 4*

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After World War II, epidemiologists realized that the babies of women that had survived the Dutch Famine had higher rates of chronic diseases. Most of these chronic diseases had and still are associated with lifestyle choices. From this the “Barker Hypothesis” or “fetal programming” theory was developed. This theory hypothesizes that the intrauterine environment will form how a baby’s metabolism would respond and function for the rest of their life. In other words, a lifetime risk for obesity, diabetes, high blood pressure, heart disease, liver and kidney function are programmed before birth.

So should we give up now? No, the risks are higher, but the development of these chronic health problems are not set in stone. Fetal programming has been seen in many populations that have experienced famine or nutritional deprivation. The lion’s share of the research in fetal programming is based on American Indian Studies with the Pima Indians. The outcome from these studies identified ways to change or decrease these risks for chronic health problems.

Breastfeeding can make a huge impact on decreasing or changing the risk for chronic health problems. Babies that are breastfed exclusively for at least 2 months have less obesity and diabetes. Combination breast and formula feeding is considered better than just formula feeding.

We must encourage lifestyle choices that change or decrease our risks for chronic health problems. In the last 30-50 years, our diet has changed to include more processed and fattening food. We have exercised less and become more sedentary. This in turn has led to the epidemic of obesity. We can, however, reverse this process.

Diet choices should include less processed foods, more fruits and vegetables that are high in fiber, and lower fat options, such as milk products and lean meats. Studies show that adults who consume at least one milk product each day were less likely to be obese than those who did not have milk products. You should limit fruit juice, sugary sodas, and high sugar cereals. Replace these with fresh fruit, water, tea, milk, and low sugar, high fiber cereals.

The Diabetes Prevention Study in the United States demonstrated that moderate exercise for an adult for 30 to 60 minutes per day; 5 days per week decreased the diabetes and obesity rate. What can be done about these offspring’s risk? Encourage kids to stay active, limit the amount of time spent at the computer, playing video games, or just watching TV. Encourage children to become active in sports and dance programs either during school or with after school programs. There are many community programs as well at little or no cost.

Environmental factors keep appearing in the media that may also be affecting long-term health. The less exposure to materials of any kind, processed, bottled, or packaged, the better you and your family are. The most recent report listed chemicals in plastic will cause metabolic changes that can lead to problems such as diabetes.

Children who have a diet high in fat and sugar, who are obese, and sedentary should be screened early for diabetes. Treatment can begin early and re-programming can get underway. The goal is to prevent long-term chronic health conditions.

#### References:

- Epstein LH, Roemmich JN, Robinson JL, Paluch RA,

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Winiewicz DD, Fuerch JH, Robinson TN. A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children. *Arch Pediatr Adolesc Med*. 2008 Mar;162(3):239-45.

- Pan XR Li GW, HU YH, et al. Effects of diet and exercise in prevention of NIDDM in people with impaired glucose tolerance. The Da Quing IGT and Diabetes Study. *Diabetes Care* 1997;20(4):537-44.
- Pettitt DJ & Jovanovic L. Birth weight as a predictor of type 2 diabetes mellitus: the U-shaped curve. *Curr Diab Rep*. 2001 Aug;1(1):78-81.
- Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with glucose intolerance. *NEJM* 2001;344(18):1343-1350.

### *Avoiding Newborn Hypoglycemia with Early Breastfeeding*

#### *Guidelines for Care, In Press 2009*

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Maintaining maternal normoglycemia during pregnancy and in particular during labor and delivery is the best way to avoid neonatal hypoglycemia (Jovanovic, 1996). Betamimetic drugs such as Ephedrine (often used to treat acute hypotension associated with epidural or spinal anesthesia) or Terbutaline (used to reduce uterine activity) given just before birth can aggravate the risk for hypoglycemia in the newborn.

Early (preferably in the first half hour of life) and frequent (10 -12 times per 24 hours) breastfeeding can reduce newborn hypoglycemia risk. Newborns that are wet and cold utilize glucose to generate warmth, therefore it is imperative to dry the newborn thoroughly and place him/her skin to skin with his/her mother as he/she feeds. Women who undergo cesarean birth should not be an exception. It is possible for an otherwise healthy newborn to begin breastfeeding in the operating room or in the recovery room. Every effort should be made to provide

care (physical assessment and glucose monitoring) needed by this couplet without separating them. Early separation of the mother baby couplet may delay lactogenesis (Ferris, 1988; Gagne 1992, Ferris 1993, Hartman, 2001) as well as increase the likelihood that the baby will be supplemented with formula.

The couplet experiencing medically necessary separation will need extra support to establish breastfeeding. The mother should be instructed on breast pump use within the first 12 hours after giving birth, although the earlier the better to ensure adequate milk supply. The pumped colostrum or milk should be fed to the newborn, if possible, by methods other than bottle and artificial nipple (cup, eyedropper or feeding syringe) to prevent nipple confusion. The information the mother was given parentally on the importance of frequent breast milk feeding without supplementation should be reinforced and mother's intent to exclusively breastfeed should be honored unless medical necessity exists to use supplemental feedings. A diabetes educator familiar with the woman's daily challenges, a lactation specialist and knowledgeable nursery and postpartum staff need to be available to support the mother and baby with special needs.

Educate mother on infant feeding cues, cluster feeding and need for flexibility in the early days of breastfeeding. If kept skin-to-skin and allowed free access to the breast, infants will nurse at frequent intervals for short periods of time throughout the day. Attempts to force routine or scheduled feedings will frustrate both mother and infant and lead to misunderstanding of infant behavior and feeding cues. Promote early feeding at the breast by one hour of age. Encourage frequent feeding until the blood glucose is stable (> 40 mg/dl before feeding). Monitor infant blood glucose screening for at least 24 hours or until stable for at least three consecutive feedings.

#### References:

- Cordero L, Treuer SH, Landon MB, Gabbe SG. Management of infants of diabetic mothers. *Arch Pediatr Adolesc Med* 1998; 152: 249-54.

- Ferris AM, Neubauer SH, Bendel RB, Green KW, Ingardia CJ, & Reece EA. Perinatal lactation protocol and outcome in mothers with and without insulin dependent diabetes mellitus. *Am J Clin Nutr* 1993; 58 (10): 43-8.
- Ferris AM & Reece EA. Nutritional consequences of chronic maternal conditions during pregnancy and lactation: Lupus and diabetes. *Am J Clin Nutr* 1994 (suppl); 59:465-73.
- Kalhan SC & Saker F. Metabolic and endocrine disorders. In Fanaroff AA, Martin RL, eds Neonatal Perinatal Medicine: Diseases of the fetus and infant. 6th edition. St Louis, MO: Mosby, 1997.
- Jovanovic L & Peterson CM. The art and science of maintenance of normoglycemia in pregnancies complicated by insulin-dependent diabetes mellitus. *Endocrine Practice* 1996; 2 (2): 130-145.
- Reece EA & Homko CJ. Infant of the diabetic mother. *Sem Perinatol* 1994; 18 (5): 459-69.
- Stokowski LC. Metabolic Disorders. In: Deacon J & O'Neill P, eds. Core Curriculum for Neonatal ICN. 2nd ed. Philadelphia, PA: WB Saunders, 1999:326-56.



## *Perinatal Complications and Neonatal Risk - Guidelines for Care, in Press for 2009*

*Leona Dang-Kilduff, RN, MSN, CDE Region 4*

Recent advances in the care of women with diabetes have improved, but not eliminated the risk of morbidity and mortality for the mother and infant from a pregnancy complicated by diabetes. Not all pregnant women are appropriately screened for diabetes, nor do all women currently receive and/or follow the multidisciplinary meticulous care required to achieve optimal outcomes.

Therefore, the maternal and newborn care providers must plan and assess for the specific problems frequently encountered by this couplet with diabetes impacting their pregnancy. The following discussion addresses 5 common complications.

### **Premature delivery**

Spontaneous premature labor occurs more frequently in women with any type of diabetes. Preterm births rates among women with diabetes vary based on the type of maternal diabetes, maternal age, and if other factors, such as congenital anomalies, are present.

To summarize the literature on premature delivery in the diabetic population:

- Premature labor occurred in 31% of 181 pregnancies among DM1 women compared to 20% in a control population. (Mimouni 88) Poor glycemic control and an associated high rate of urinary tract infections may have contributed to the development of premature labor. Polyhydramnios, hypomagnesemia, and severity of diabetes by the White classification were not risk factors.
- A similar preterm delivery rate of 31% was noted in a study of women with DM 2. (Clausen 05)
- One third of 110 diabetic pregnancies studied delivered prematurely because of preeclampsia (Kitzmilller 78).
- Preeclampsia has also shown to cause iatrogenic preterm delivery (Green 89, Kitzmilller 78).

Overall rates of prematurity seen in Sweet Success clients are comparable to those in the general birthing population in Califor-

nia with a rate of 10.1% (Sweet Success) versus 9% (State). (CDAPP Data Report, 2001-2003).

### **Late Preterm Births:**

#### **Special Considerations**

The risks and benefits of an early delivery needs careful evaluation. Any birth prior to 37 weeks gestation increases risks to both mother and infant. Infants born between 34 and 36 6/7 weeks gestation are considered to be "late preterm". Late preterm infants have an increased risk of neonatal morbidity and mortality including:

- A higher risk for respiratory instability (Wang, 2004); cold stress, and metabolic instability, specifically hypoglycemia (Laptook & Jackson, 2006).
- Longer hospital stays, higher costs, and more complications than term births (Wang, 2004).

### **Perinatal asphyxia**

DM is associated with an increased risk for intrauterine or perinatal asphyxia, which often is defined broadly to include fetal heart rate abnormalities during labor, low Apgar scores, and intrauterine death. In a study of 162 DM women, for example, 27% of fetuses had perinatal asphyxia (Mimouni 88). Perinatal asphyxia was correlated with hyperglycemia during labor, prematurity, and nephropathy. Maternal vascular disease, manifested by nephropathy, may contribute to the development of fetal hypoxia, oxidative stress and subsequent perinatal asphyxia and potential still birth. (Dudley 07)

### **Birth injury**

Macrosomia occurs among all classes of diabetic pregnancies, except those with vasculopathy that results in intrauterine growth restriction (IUGR). Infants of women with diabetes typically appear large and plethoric, with excessive fat accumulation in the abdominal and scapular regions, and visceromegaly. Macrosomia predisposes the neonate to birth injury, especially shoulder dystocia, and can result in brachial plexus injury; clavicular or humeral fractures, perinatal asphyxia, and less often, cephalohematoma, subdural hemorrhage, or facial palsy. (Tyrala 96; Gregory 98) Nearly one-third

of large neonates (at least 4 kg) born to DM1 women have shoulder dystocia (Acker 86). Macrosomic infants of women with diabetes are 1.7 times more likely to have shoulder dystocia than are infants of nondiabetic mothers, and of similar weight (Nesbitt 98; Rosenn 96). To avoid shoulder dystocia, cesarean delivery without labor often is recommended in diabetic pregnancies if the fetal weight is estimated to be greater than 4300-4500 gm (Nesbitt 98). Ultrasound parameters are of limited use in predicting macrosomia.

### **Intrauterine growth restriction (IUGR)**

IUGR can occur in poorly controlled diabetes, especially when diabetes is complicated by vasculopathy. Preeclampsia, a frequent complication of diabetic pregnancies, can further impair growth by impeding flow of blood and nutrients to the fetus. Congenital anomalies associated with diabetic pregnancies also may lead to IUGR. Although close control of maternal glucose limits the development of macrosomia, excessively aggressive glucose control may lead to growth restriction. In one study, for example, diabetic women with postprandial glucose concentrations less than 130 mg/dL 97.3 mmol/L, (whole blood) had infants who were small for gestational age (SGA) more often than those with values above this level (18 % versus 1%) (Combs 92).

#### **References**

- Acker DB, Sachs BP, & Friedman EA. Risk factors for shoulder dystocia in the average-weight infant. *Obstet Gynecol.* 1986; 67:614.
- CDAPP Data Report, 2001-2003. <http://www.cdph.ca.gov/data/statistics/Documents/MO-CDAPP-Report2001-2003.pdf>
- Clausen TD, et al., Poor pregnancy outcome in women with Type 2 diabetes. *Diabetes Care.* 2005; 28 (2): 323-8.
- Combs CA, Gunderson E, Kitzmilller JL, et al. Relationship of fetal macrosomia to maternal postprandial glucose control during pregnancy. *Diabetes Care* 1992; 15:1251.
- Dudley DJ. Diabetic-associated stillbirth: incidence, pathophysiology, and prevention. *Obst Gynecol Clinics of North Am.* 2007; 34:293-307.
- Nesbitt TS, Gilbert WM, & Herrchen B. Shoulder dystocia and associated risk factors with macrosomic infants born in California. *Am J Gynecol.* 1998; 179: 476.
- Wang ML, Dorer DJ, Fleming MP, et al. Clinical outcomes of near-term infants. *Pediatrics.* 2004; 114: 372-376.

Additional references available upon request.

## Contraceptive Choices for Pre-existing Diabetes and Gestational Diabetes Mellitus

Leona Dang-Kilduff, RN, MSN, CDE, Region 4

	Pre-existing Diabetes and Gestational Diabetes Mellitus
Natural Family Planning—periodic abstinence, calendar method, ovulation method, symptothermal method, continuous breastfeeding, and withdrawal	<ul style="list-style-type: none"> <li>Significant failure rates of 0.2–27%</li> </ul>
Spermicides	<ul style="list-style-type: none"> <li>High failure rates of 14–30% if used alone.</li> </ul>
Barrier Methods—condoms, diaphragm, cervical cap	<ul style="list-style-type: none"> <li>Higher failure rates. Condoms provide protection against HIV and STD's. Failure rates improve with the addition of spermicides.</li> </ul>
Sterilization	<ul style="list-style-type: none"> <li>Surgical procedure, usually not reversible</li> </ul>
IUD	<ul style="list-style-type: none"> <li>Up to 99% effective at preventing pregnancy.</li> <li>Those that contain hormones do not have a systemic effect on blood glucose.</li> </ul>
Hormonal Methods—birth control pills, injections, patches, vaginal rings, and implants	<ul style="list-style-type: none"> <li>Prevent ovulation, require monitoring of weight, blood pressure, pre and post glucose, fasting lipids, and vascular screen.</li> <li>Not recommended for women who smoke or have micro and/or macrovascular complications.</li> <li>Increase the incidence of depression.</li> <li>May affect lipids by decreasing HDL and increasing LDL and cholesterol.</li> <li>Combination pills not recommended until breastfeeding is well established at 6 weeks-3 months. Not shown to affect glucose intolerance.</li> <li>Progestin only will increase glucose intolerance for preexisting DM and may require medication adjustment.</li> <li>Progestin only for GDM will nearly triple the diabetes diagnosis above women using non-hormonal methods while breastfeeding. It is not recommended.</li> </ul>
Emergency Contraception	<ul style="list-style-type: none"> <li>1–2% failure rate and is only method post sexual activity.</li> </ul>



Contraception for women with diabetes is similar to other women, but due to the chronic disease status for preexisting diabetes and glucose intolerance for gestational diabetes mellitus (GDM), frequent monitoring is recommended.

If no contraceptive method is employed, there is an expected pregnancy rate of 85%. Multiple pregnancies from the first pregnancy with GDM increase the diabetes risk.

Natural family planning, spermicides, barrier methods, and sterilization do not have a systemic effect and are considered to be metabolically neutral.

#### References:

- ACOG Practice Bulletin. Use of hormonal contraception in women with coexisting medical conditions. *Obstet and Gynecol* 2006;107(6):1453-72.
- Ahmed SV, Hovind P, Parving HH, Rossing P, Price DA, Laffel LM, Lansang MC, Stevanovic R, Fisher NDL, Hollenberg NK. Oral contraceptives, angiotension-dependent renal vasoconstriction, and risk of diabetic nephropathy. *Diabetes Care* 2005;28(8):1988-84.
- Bruns CM, Kemnitz JW. Sex hormones, insulin sensitivity, and diabetes mellitus. *ILAR Journal*. 2004;45(2):160-9.
- Burnton J, Beal MW. Current issues in emergency contraception: an overview for providers. *J of Midwifery and Women's Health*. 2006;51(6):457-63.
- Dang-Kilduff LJ. After a pregnancy with diabetes: Postpartum care and contraception. *On the Cutting Edge: Diabetes Care and Education*. 2002; 23(2): 18-22.
- Garg SK, Chase HP, Marshall G, Hoops SL, Holmes DL, Jackson WE. Oral contraceptives and retinal complication in young women with insulin-dependent diabetes mellitus. *JAMA* 1994; 271(14): 1099-1102.
- Grigoriyan OR, Grodnitskaya EE, Andreeva EN, Shestakova MV, Mel-

nichenko GA, Dedov I. Contraception in perimenopausal women with diabetes mellitus. *Gynecological Endocrinology* 2006;22(4):198-206.

- Heroux K. Contraceptive choices in medically ill adolescents. *Seminars in reproductive med.* 2003;21(4):389-98.
- Kaunitz AM. Beyond the pill: new data and options in hormonal and intrauterine contraception. *Am J of Obstet Gynecol* 2005;192(4):998-1004.
- Kim C, Seidel KW, Begier EA and Kwok YS. Diabetes and depot medroxyprogesterone contraception in Navajo women. *Arch of Internal Medicine.* 2001;161(14):1766-1771.
- Kjos SI. Postpartum care of the woman with diabetes. *Clin Obstet Gynecol* 2000; 43(1): 75-86.
- Peterson KR, Skouby SO, Sidemann J, Mlsted-Petersen L, Jespersen J. Effects of contraceptive steroids on cardiovascular risk factors in women with insulin-dependent diabetes mellitus. *Am J Obstet Gynecol* 1994; 171 (2): 400-5.

*Additional References available upon request.*

## *Beyond the Numbers*

### *Charlene Canger, MFT, LCSW, Region 4*

Critical but frequently underutilized perinatal mental health research issues were the closing topics of the recent Sweet Success Express conference in Anaheim. Anna Spielvogel, MD, PhD, a Clinical Professor at UCSF specializing in woman's psychiatric care presented an overview of perinatal mental health complications followed by a session on psychotropic medication and breastfeeding. Sara Paredes, RN, MSN, co-presenter, coordinates and provides Sweet Success care at San Francisco General Hospital's (SFGH) High Risk Obstetric Clinic which enviably provides integrated obstetric and mental health services for the city's most disenfranchised and troubled citizens.

Dr. Spielvogel first described the scope of mental health complications and depression during the perinatal period, offering hard realities and possible interventions relevant in a Sweet Success clinic. Among the sobering information about the incidence of psychiatric illness in pregnancy and the resulting fetal risk, the audience was reminded that:

- Anxiety & depression impact obstetrical outcome as seen in low birth weight (LBW), small for gestational age (SGA), premature delivery, decreased fetal growth, & labor complications
- Major Depression occurs in 10-17% of pregnant women, negatively affecting outcome similar to above
- Eating disorders occur infrequently in pregnancy (anorexia 0.5-3.7%; bulimia 1.1-4.2%) complicating outcome with LBW, inadequate or excessive weight gain, hyperemesis, premature delivery, cesarean section, and low Apgar score

Bipolar disorder (BPD) occurs in 1.2% of pregnancies and is not well studied but complications include increased substance abuse (given that many women discontinue their medication before and during pregnancy) and increased risk for postpartum psychosis. LBW and prematurity are complications, plus unattended delivery and stillbirth.

Dr. Spielvogel carefully reviewed the complex risk benefit analysis of psychotropic medication in pregnancy and how specific cases can be managed safely for both the mother and neonate.

Illustrative of SFGH's integrated care model, Sara Paredes, MSN described their Sweet Success program and universal screening using the Edinburgh (pronounced Ed-in-bu-ro as in Edinburgh, Scotland where it was developed) Postnatal Depression Scale (EPDS). She presented key points of the EPDS and how she uses it to uncover depressive symptoms not seen by "just knowing" a woman. Most of the women welcomed the opportunity to discuss their feelings with staff.

Sara also emphasized that depression and anxiety negatively impact appetite, sleep, concentration, memory, and effective coping strategies- all key to successful diabetes self-management. She encouraged the audience to practice taking and scoring the screening tool to see that it is a much easier task than other Sweet Success "requirements". Sara explained how the integrated care model assisted her in separating diabetes assessment and teaching from psychosocial issues while also adding expertise and supportive care for the professionals.

The audience raised many levels of questions including the need for a solid infrastructure of support for the professionals when depression and anxiety screening is set up in a Sweet Success clinic. A particularly poignant interchange was worth noting. A nurse from New Jersey where EPDS screening has been in place for years tackled a more complex struggle of caring for poor, chronically oppressed, and very angry pregnant women at her clinic. With the ease born out of working with women with such great need, Sara and Dr. Spielvogel both attended to the complexity of establishing a relationship with deeply hurt women before any care begins. Sara sensitively suggested an invitational style "Here's what may help you and your pregnancy, but it is all up to you", modeling detachment and not power struggles. Dr. Spielvogel demonstrated how she addressed the deeper issues behind angry, threatening behavior by directly stating "I understand how it would be hard to trust me given all that has happened in your life."



## Nutrition Guideline Revisions for Sweet Success

Cathy Fagen, MA, RD, RPPC/CDAPP Coordinator Region 6.1



As we make progress over the years through research studies and clinical experience, we need to revise and update our clinical guidelines for standards of practice.

The American Dietetic Association is now using "Evidence-Based Guidelines" to guide the registered dietitian (RD) in providing clinical care in their areas of practice.

The California Diabetes and Pregnancy Program (CDAPP) has been working on revisions for the Sweet Success Guidelines for Care so the recommendations that we promote are also evidence-based and supported by research literature. Regional CDAPP RDs have nearly completed the revisions for the nutrition chapter of the Guidelines for Care (GFC). Below are a few highlights of what you can expect in the upcoming revision.

**Fat Recommendations:** Encourage mono-unsaturated fats (canola oil, olive oil, olives, nuts, sesame seeds and avocado), limit saturated fats to <7% of total calories (animal fat, dairy fat, palm and coconut oil) and limit trans fats to <1%. Trans fats start out as polyunsaturated fats (PUFAs or omega-6) but go through a hydrogenation process to improve the shelf life of the product. Sources of trans fats are baked products, cookies, chips, and foods fried in shortening. These fats raise the bad cholesterol (LDL) and lower the good cholesterol (HDL) in our blood. Also, too much omega-6 (PUFAs) in the diet inhibits the action of omega-3 fatty acids. There is a good deal of evidence that omega-3 fatty acids are necessary for the complete development of the human brain during pregnancy and through the first two years of life. Omega-3 fatty acids are essential fatty acids, meaning they cannot be manufactured in the body. There are three principal omega-3s: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). DHA is critical for neurogenesis.

Women who consume an inadequate amount of DHA are at increased risk of poor infant visual and cognitive development. ALA (found in leafy greens, flax-seeds, walnuts and algae) is a precursor to DHA and EPA but does not convert readily in the human body. A suggested recommendation for pregnant and lactating women is to consume dietary sources of at least 200-300 mg DHA/day.<sup>1,2</sup> Consuming 12 oz/wk (two to three 4-6 oz cooked portion sizes) of fish and shellfish (particularly fatty, deep water marine species) is recommended with avoidance of shark, swordfish, king mackerel and tilefish (sources of methyl mercury). The safety of fish oil supplements is not yet established and cannot be routinely recommended during pregnancy.<sup>3</sup> Other sources of DHA in the diet are eggs and fortified food products.

**Carbohydrate Recommendations:** The recommended dietary allowance (RDA) for carbohydrate (CHO) in pregnancy is 175 gm/day. The Sweet Success GFC recommend the meal plan for diabetes in pregnancy consist of 40-45% of the calories from carbohydrate with a minimum of 175 gm CHO/day. For obese women with a body mass index > 29 the CHO recommendations need to be individualized with a minimum of 175 gm/day.

**Ketone Testing:** In the case of gestational diabetes (GDM), urine ketone testing is recommended to identify whether the woman is consuming adequate kilocalories and/or carbohydrates. Urine ketone testing is encouraged in the event of persistent weight loss or presumed inadequate food intake. Ketones in the urine may be the result of inadequate kilocalorie/carbohydrate intake or over exercising as a result of a woman's wish to control blood glucose levels without the use of insulin therapy. Unintentional reasons for the presence of urine ketones might be a misunderstanding of the meal plan pattern, carbohydrate food choices, and/or inappropriate portion sizes. Checking the urine for ketones is an inexpensive and rapid method for the RD to assess whether the woman is knowingly or unknowingly restricting her

intake of kilocalories and/or CHO. In a normal pregnancy, ketones will be present in the urine after a 14 hour fast. This state is referred to as starvation ketosis. The goal is for urinary ketone levels to be none or trace. If large amounts of urine ketones are found, the RD needs to identify the reason for ketone production and can recommend the following to avoid starvation ketosis:

- Avoid long periods of fasting.
- Assure adequate kilocalorie and carbohydrate intake throughout the day.
- Schedule snacks about 2-3 hours after meals.
- Schedule bedtime snack no more than 10 hours before the next meal time.

- Provide a minimum of 7 grams of protein and 15-30 grams of CHO in the bedtime snack.

**Post-Gastric Bypass Patients:** Many clinicians have been inquiring about care of women in their Sweet Success programs who have had bariatric surgery. The ideal situation is to provide pre-conception nutritional assessment and counseling for these women. Other points covered in the GFC revisions include:

- Prenatal vitamins in addition to the woman's usually prescribed V/M supplementation (liquid or chewable form)
- Post stabilization, patients can usually ingest  $\leq 1200$  kcal/day
- Calcium – 1200-1500 mg calcium citrate with vitamin D is the optimal form
- Folic Acid – measure serum blood levels
- Iron – 40-64 mg ferrous fumarate. Check periodic Hgb levels to verify sufficiency
- Vitamin B12 – 500 mcg in crystalline form.
- Check serum cobalamin periodically to ensure sufficiency.
- Eat 3-6 small meals a day.

- Protein should be preferentially eaten before fats and CHO, ideally 60-80gm/day.
- Avoid bolus eating, meal time 20-30 min.
- Small volumes, well chewed.
- Avoid liquids during meals. Ingest 30-60 minutes before or after meals. Recommend sugar-free, caffeine-free and non-carbonated beverages.
- Avoid chewing gum (possible obstruction if swallowed).

**Weight Gain Recommendations:** The Institute of Medicine (IOM) weight gain recommendations are currently being re-evaluated. Weight gain below and above the IOM guidelines is associated with maternal and fetal complications. Excessive weight gain in obese women has increased the risk of macrosomia, hypertension, and cesarean section.<sup>4</sup> Restricting usual intake by 30-33% in obese pregnant women has been demonstrated to prevent macrosomia.<sup>5</sup> Moderate caloric restriction (reduced by 30% of energy needs) in obese women with GDM may improve glycemic control without ketonemia and reduce weight gain.<sup>6</sup> Sustained weight loss is not recommended during pregnancy.

The Sweet Success recommended weight categories according to BMI are derived from both the Institute of Medicine and the National Heart, Lung and Blood Institute. The table at the right shows the lower end cut off for underweight of BMI < 19.8 and the cut off for obese with a BMI > 29.0 (IOM recommendation) and the lower end cut off for overweight of BMI ≥ 25 (National Heart, Lung and Blood Institute recommendation). Population specific BMI cut-off points may need to be considered for determining a weight category in certain populations. For example, in Asian women it is recommended that the overweight category begins at a BMI of 23.<sup>7</sup> In evaluating the woman's weight gain during pregnancy, both total weight gain and rate of weight gain must be considered. Follow the pattern of weight gain every two to four weeks and make changes in the exercise and medical nutrition therapy plan accordingly.

**One Abnormal Value on the 3 hr OGTT:** Women with one abnormal value on the 3 hour oral glucose tolerance test are considered to have CHO intolerance in pregnancy or mild gestational hyperglycemia. These women should be treated similarly to women with GDM. Other guidelines and protocols have not been established, but Sweet Success recommends these women receive dietary intervention and some form of glucose monitoring to reduce perinatal morbidity.

For further information about the revised nutrition recommendations in the Sweet Success GFC contact your local regional CDAPP RD listed on the Sweet Success Web site regional directory at [www.cdph.ca.gov/programs/CDAPP](http://www.cdph.ca.gov/programs/CDAPP)

References:

- Cunnane SC et al. Recommendations for intake of polyunsaturated fatty acids in healthy adults. Brighton, UK: International Society for the Study of Fatty Acids and Lipids, 2004: 22.
- Benisek, et al. Dietary intake of polyunsaturated fatty acids by pregnant or lactating women in the United States. *Obstet Gynecol*, 2000. 95:S77-S78.
- Position of the American Dietetic Association and Dietitians of Canada: Dietary Fatty Acids. *J Am Diet Assoc* 2007; 107: 1599-1611.
- Jensen, DM et al. Gestational weight gain and pregnancy outcomes in 481 obese glucose-tolerant women. *Diabetes Care* 2005; 28:2118-2122.
- American Diabetes Association. Gestational diabetes. In: Jovanovic L, editor-in-chief. 3<sup>rd</sup>

ed. Medical management of pregnancy complicated by diabetes. Alexandria, VA; American Diabetes Association, 2000: 114-132.

- Position statement of the American Diabetes Association: Nutrition Recommendations and Interventions for Diabetes. *Diabetes Care* 2007; 30 (1): S48-S65.
- WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*, January 2004; 363: 157-163.



### Weight Gain Recommendations

Sweet Success Weight Categories	Underweight BMI < 19.8 < 90% IBW	Normal BMI 19.8–24.9 90-120% IBW	Overweight BMI 25-29 121-150% IBW	Obese BMI > 29.0 > 150% IBW
Total Weight Gain Range:	28 to 40 lbs	25 to 35 lbs	15 to 25 lbs	15 or less
2nd/3rd Trimester Rate of Gain per month	4 lbs or more	3 to 4 lbs	≈ 2 lbs	varies



**CDAPP REGIONAL PROGRAMS  
NOVEMBER 2008**

*Region 1 and Region 3*  
North Coast Region  
East Bay Region  
415-476-9877

*Region 2*  
Northeast Region  
916-733-1705

*Region 4*  
Mid-Coastal California Region  
650-723-5763

*Region 5*  
San Joaquin/Sierra Region  
559-244-4546

*Region 6.1*  
Miller Children's Hospital  
Perinatal Outreach Education  
Program  
562-595-7930

*Region 6.2*  
Harbor/UCLA Medical Center  
South Bay  
310-222-3651

*Region 7*  
Inland Counties Region  
909-558-3996

*Region 8*  
Orange County Region  
562-945-6484

*Region 9*  
San Diego & Imperial Counties  
858-536-5090

*Region 10*  
Kaiser Permanente System-North  
408-366-4102

*Region 11*  
Kaiser Permanente System-South  
951-353-3569

*CDAPP Regional Data  
Center*  
562-945-6484

*CDAPP Resource Center*  
858-536-5090

## Upcoming Educational Opportunities

**February 6-8, 2009** ADA 56th Annual Advanced Postgraduate Course, New York.

**February 25-26, 2009** Loma Linda University Medical Center is having a Sweet Success Affiliate Training. For more information call (909) 558-3936.

**February 27, 2009** Loma Linda University Medical Center is having a Sweet Success Insulin Pump Training. For more information call (909) 558-3936.

**March 31-April 1, 2009** Harbor UCLA Medical Center is having a Sweet Success Affiliate Training. For more information call (310) 222-3651.

**April 21-24, 2009** CDC Diabetes Conference, Hyatt Regency Hotel, 200 South Pine Ave, Long Beach, CA.

**June 5-9, 2009** ADA 69th Scientific Sessions, New Orleans, Louisiana.

**August 5-8, 2009** AADE Annual Meeting in Atlanta, Georgia. Diabetes Educators: Exploring New Dimensions.

Regional Program Address



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