



UNDERSTANDING GESTATIONAL DIABETES-MANAGEMENT AND PREVENTION

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LEARNING OBJECTIVES

- 1. Define gestational diabetes.
- 2. Identify the effects of gestational diabetes on the mother and baby.
- 3. List risk factors associated with gestational diabetes.
- 4. Describe the complications of gestational diabetes.
- 5. Distinguish the screening methods for gestational diabetes.
- 6. Recognize the methods to maintain normal blood glucose level.
- 7. Describe prevention and follow up for gestational diabetes.

DIABETES MELLITUS

- **Diabetes - random plasma glucose ≥ 200 mg/dL [11.1 mmol/L] or fasting blood glucose ≥ 126 mg/dL [7.0 mmol/L], (ADA, 2018).**

Types of diabetes (ADA, 2018)

- **1. Type 1 diabetes (due to autoimmune β -cell destruction, usually leading to absolute insulin deficiency) , Most commonly diagnosed in childhood or early adulthood (NIDDK, 2016).**

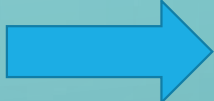
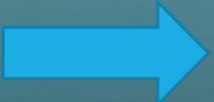

TYPES OF DIABETES (CONTD)

- **2. Type 2 diabetes-body becomes resistant to insulin signaling, with subsequent impaired insulin production from pancreatic β cells causing blood glucose levels to rise (NIDDK,2018).**
- **3. Gestational diabetes mellitus (GDM)- hormone made by the placenta prevents the body from using insulin effectively. Glucose builds up in the blood instead of being absorbed by the cells.**

TYPES OF DIABETES (CONTD)

- **4. Specific types e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity onset diabetes of the young [MODY]), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation) (ADA,2018)**

GESTATIONAL DIABETES MELLITUS (GDM)

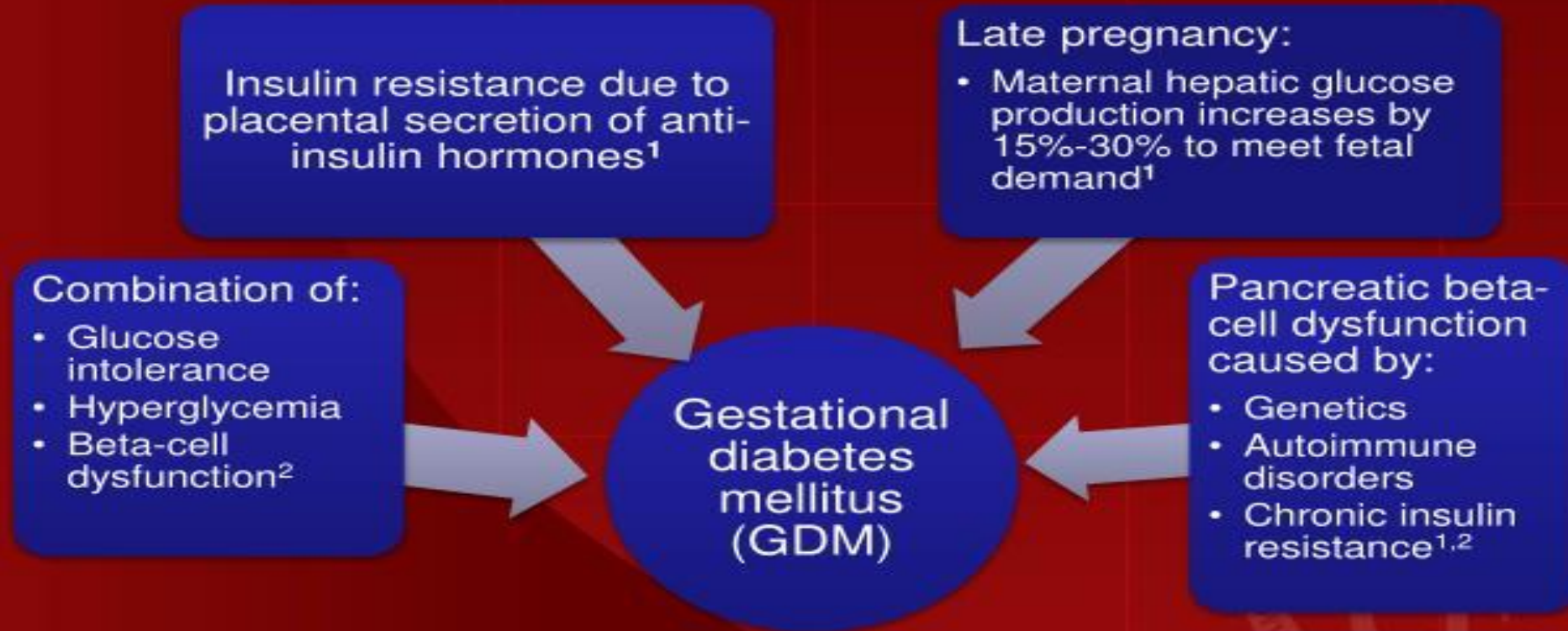
- **Carbohydrate intolerance**  **hyperglycemia**
(American College of Obstetricians and Gynecologists [ACOG], 2017).
- **Diagnosed in second or third trimester of pregnancy (ADA, 2018).**
- **6% to 9% of pregnancies are complicated by diabetes; 90% of which are gestational diabetes mellitus (ACOG, 2017).**
- **Controlled through regular exercise, proper diet; however, some women may need to take medication (ACOG, 2017).**
- **Women with GDM**  **type 2 diabetes (T2DM),**

- **High body mass index or sedentary lifestyle (ADA, 2016).**

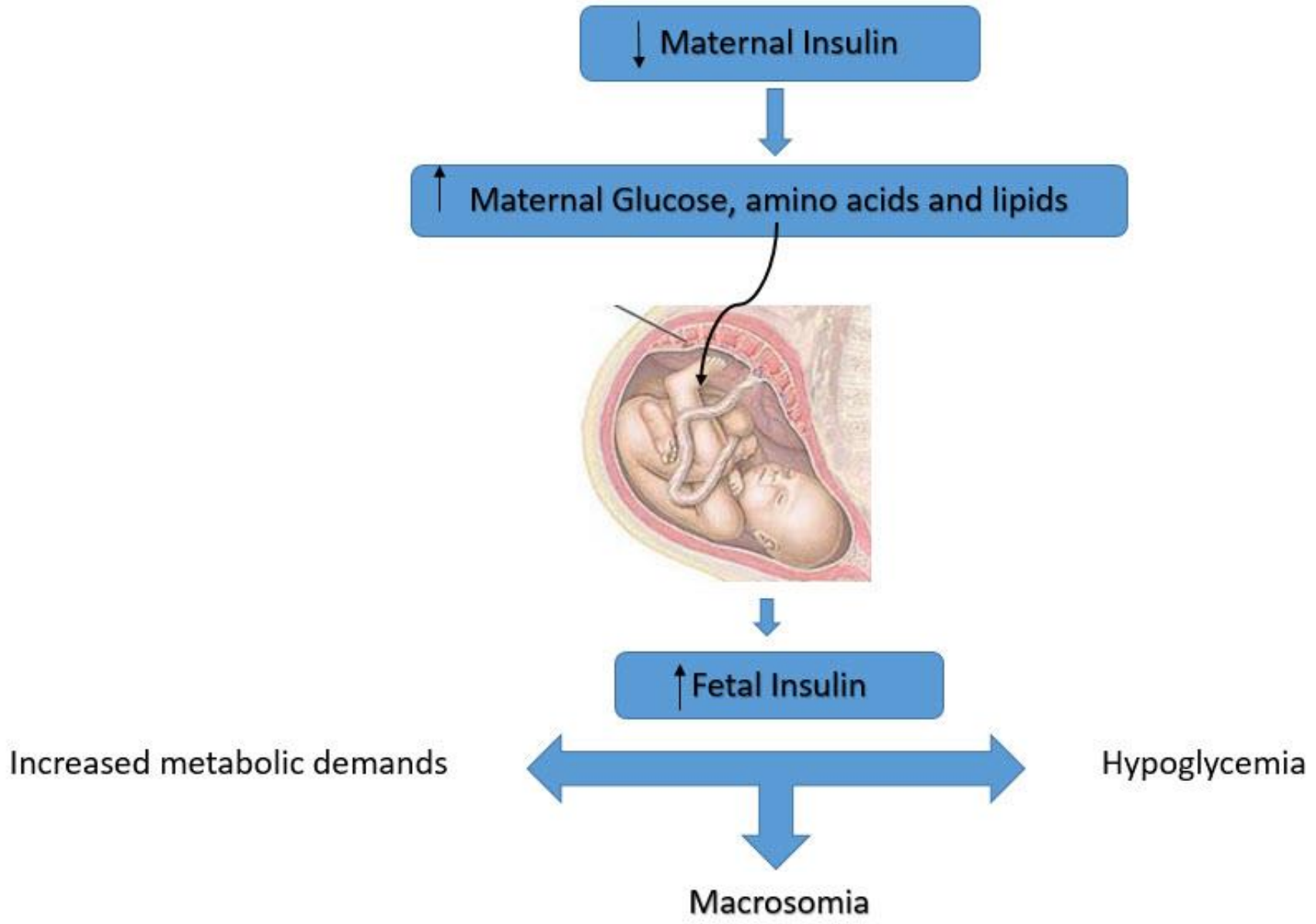
WHAT CAUSES GESTATIONAL DIABETES MELLITUS?

The placenta supplies a growing fetus with nutrients, and also produces a variety of hormones to maintain the pregnancy. Some of these hormones (estrogen, cortisol, and human placental lactogen) can have a blocking effect on insulin. This is called contra-insulin effect, which usually begins about 20 to 24 weeks into the pregnancy.

As the placenta grows, more of these hormones are produced, and the risk of insulin resistance becomes greater. Normally, the pancreas is able to make additional insulin to overcome insulin resistance, but when the production of insulin is not enough to overcome the effect of the placental hormones, gestational diabetes results.

GDM: Pathophysiology





SYMPTOMS

- **Excessive hunger**
- **Excessive thirst**
- **Fatigue**
- **Frequent urination**
- **Yeast infection**
- **Blurred vision**
- **Frequent infection including those of the bladder, vagina, and skin**
- **Nausea and vomiting**
- **Weight loss despite increased appetite**

PREVALENCE OF GESTATIONAL DIABETES

- **A study on prevalence estimates of gestational diabetes mellitus in the United States, Pregnancy Risk Assessment Monitoring System (PRAMS), 2007–2010 shows that the prevalence of gestational diabetes is 9.2% in 2010, 8.5% in 2009-2010 and 8.1% in 2007–2008. (DeSisto, Kim & Sharma, 2014). Prevalence varied by maternal race/ethnicity; Asian/Pacific Islanders and Hispanics had the highest prevalence estimates (16.3% and 12.1%, respectively), Non-Hispanic whites had the lowest prevalence estimate (6.8%) in 2010 (DeSisto et al., 2014).**

RISK FACTORS

- **Obesity**
- **Being >25 years old**
- **History of GD in a previous pregnancy**
- **Large baby (9 pounds or more) in a previous pregnancy**
- **High blood pressure**
- **History of heart disease**
- **Polycystic ovary syndrome (PCOS)**
- **Ethnicity (African American, Asian American, Hispanic, Native American, or Pacific Island background)**

(ACOG, 2017)

COMPLICATIONS

Maternal

- Nephropathy
- Retinopathy
- Coronary artery diseases
- Hyperglycemia / hypoglycemia / ketoacidosis
- Pre-eclampsia
- Infection

Fetal

- Congenital abnormalities: cardiac and neural tube defect
- Macrosomia
- RDS
- Hypoglycemia
- Polycythemia
- Hyperbilirubinemia



MATERNAL COMPLICATIONS

- **Gestational hypertension**
- **Preeclampsia**
- **Labor difficulties**
- **Severe tears in the vagina or the area between the vagina and the anus with a vaginal birth**
- **Cesarean delivery and heavy bleeding after delivery (ACOG, 2017)**

THE HYPERGLYCEMIA AND ADVERSE PREGNANCY OUTCOMES (HAPO) STUDY

- **International, multicenter study**
- **Assess the risks of adverse consequences linked with maternal glucose concentrations (HAPO 2008)**
- **Primary conclusions -birth weight greater than 90th percentile, primary cesarean section delivery, neonatal hypoglycemia, and cord C-peptide greater than 90th percentile.**
- **Secondary results included preeclampsia, preterm delivery, shoulder dystocia/birth injury, hyperbilirubinemia, and intensive neonatal care.**

FETAL COMPLICATIONS

Macrosomia(birthweight over 4000 g), most common fetal complication, incidence 15%–45%

Neonatal hypoglycemia

Hyperbilirubinemia 10%–13% of neonates

Birth trauma

Respiratory distress syndrome

Increased risk of stillbirth

Shoulder dystocia

(ACOG, 2017;ADA, 2016;Reece,2010,Esakoff, 2009; Boulet, 2003).

How will it affect your baby?

- If your baby is too overweight, it can lead to macrosomia

-macrosomia: “big baby syndrome”; fetus is abnormally large

- Overweight in childhood and adulthood
- Chances of jaundice are increased



FETAL COMPLICATIONS (CONTD)

- **Hypoglycemia can occur in 3%–5% of infants because of increased fetal insulin production in response to maternal hyperglycemia, which can increase the risk of seizures.**
- **Shoulder dystocia is rare, but it can lead to brachial plexus injury.**
- **Long-term complications include increased risk of impaired glucose tolerance, type 2 diabetes, hypertension, obesity, and dyslipidemia (Mitanech, 2014).**

SCREENING AND DIAGNOSIS OF GDM

- **GDM diagnosis can be accomplished with either of two strategies:**
 - **1. “One-step” 75-g OGTT or**
 - **2. “Two-step” approach with a 50-g (nonfasting) screen followed by a 100-g OGTT for those who screen positive (ADA, 2016). The OGTT should be performed in the morning after an overnight fast of at least 8 hours at 24–28 weeks of gestation in women not previously diagnosed with overt diabetes (ADA, 2016).**

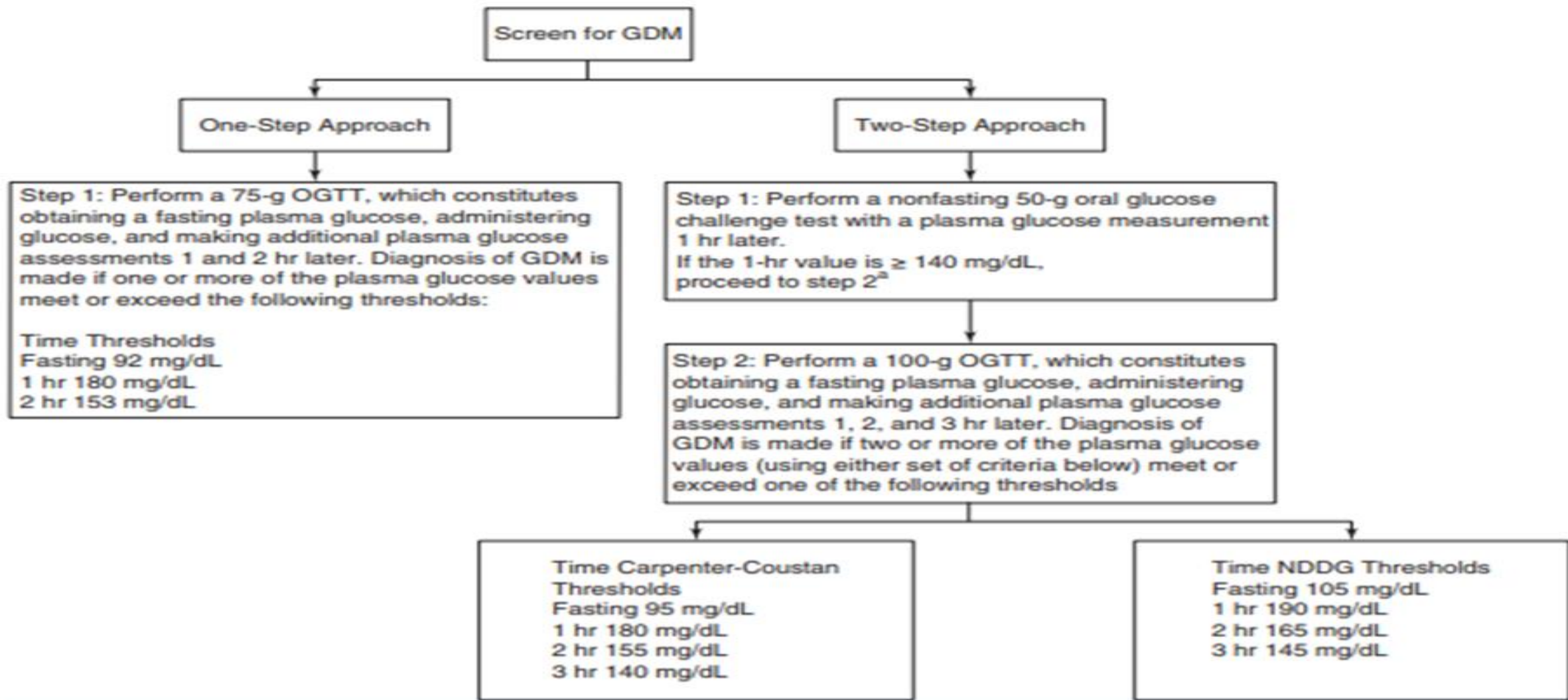


Figure 1-1. Screening and diagnostic criteria for gestational diabetes mellitus

^aSome clinicians may use a 1-hr threshold of 130 or 135 mg/dL, though the ADA recommends 140 mg/dL. In addition, some clinicians may begin empiric therapy for GDM if the step 1 plasma glucose result is > 200 mg/dL and not proceed to step 2, though the ADA does not include that recommendation in its guidelines.

GDM = gestational diabetes mellitus; NDDG = National Diabetes Data Group; OGTT = oral glucose tolerance test.

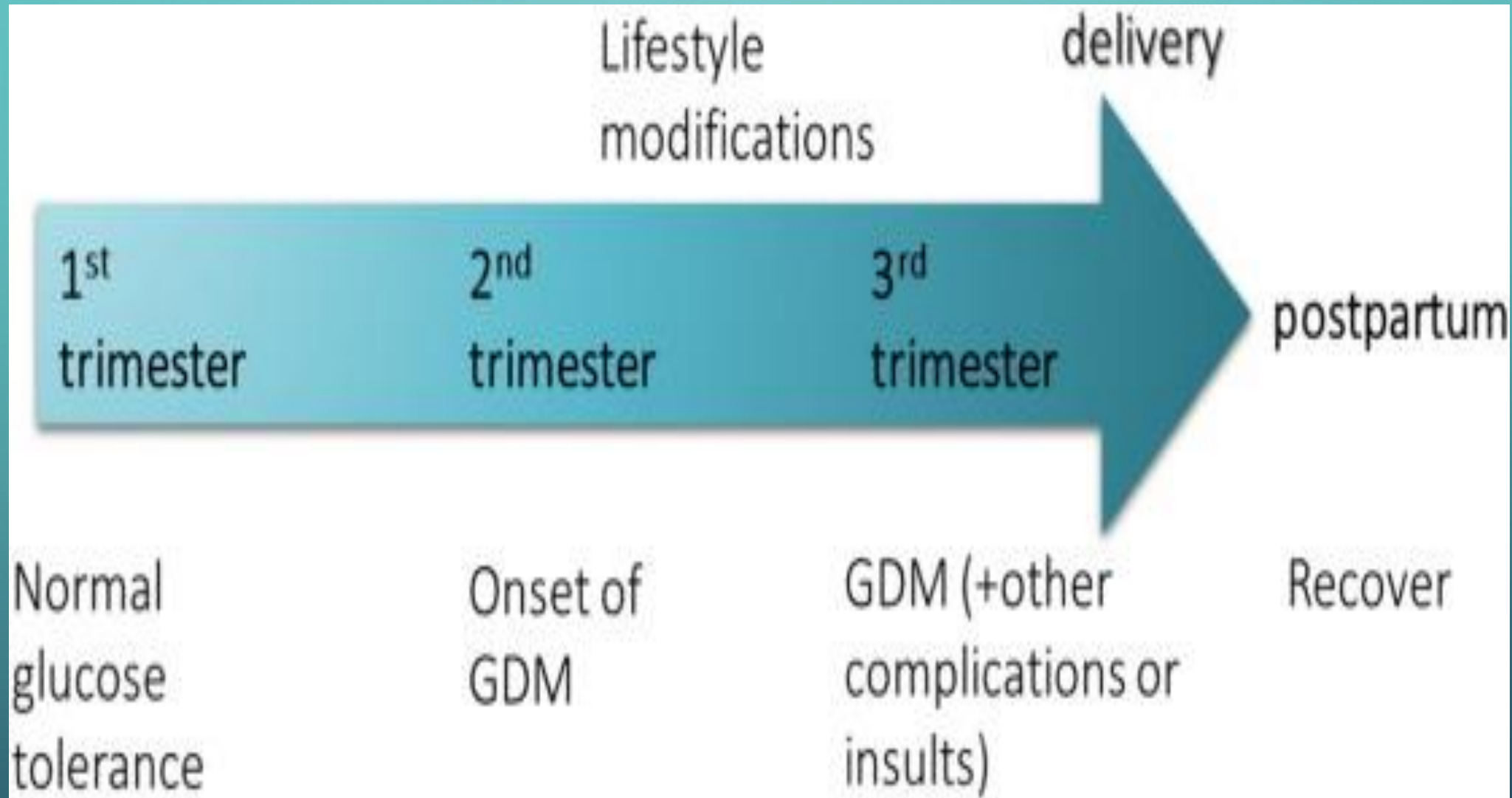
Information from: Garrison A. Screening, diagnosis, and management of gestational diabetes mellitus. *Am Fam Physician* 2015;91:460-7.

SCREENING FOR AND DIAGNOSIS OF GDM

- **The two-step approach has been recommended by ACOG and an NIH consensus development program (ACOG 2013).**
- **ACOG recommends a lower threshold of 135 mg/dL (7.5mmol/L) in high risk-ethnic populations with higher prevalence of GDM (ACOG, 2018 & ADA, 2016)**

MANAGEMENT OF GESTATIONAL DIABETES

- **Medical nutrition therapy, physical activity, weight management depending on pregestational weight and pharmacological management.**
- **Lifestyle change is an essential component of management of gestational diabetes mellitus (ADA,2019).**
- **Depending on the population, studies suggest that 70–85% of women diagnosed with GDM under Carpenter-Coustan or National Diabetes Data Group (NDDG) criteria can control GDM with lifestyle modification alone (Mayo , Melamed , Vandenberghe & Berger,2015)**



Pharmacological Management

- **Insulin is the preferred medication for treating hyperglycemia in gestational diabetes mellitus as it does not cross the placenta to a measurable extent (ADA,2019; ACOG,2017).**
- **Metformin and glyburide should not be used as first-line agents, as both cross the placenta to the fetus (ADA, 2019; ACOG,2017).**
- **All oral agents lack long-term safety data.**
- **Glyburide may have a higher rate of neonatal hypoglycemia and macrosomia than insulin or metformin (ADA,2019).**

GLUCOSE MONITORING

- **Fasting, preprandial, and postprandial self-monitoring of blood glucose are recommended in both gestational diabetes mellitus and pregestational diabetes in pregnancy to achieve glycemic control (ADA,2019). Target blood glucose values are:**
 - **Fasting <95 mg/dL (5.3 mmol/L) and either**
 - **One-hour postprandial <140 mg/dL (7.8 mmol/L) or**
 - **Two-hour postprandial <120 mg/dL (6.7 mmol/L)**

GLUCOSE MONITORING

- **Due to increased red blood cell turnover, A1C is lower in normal pregnancy than in normal nonpregnant women.**
- **The A1C target in pregnancy is 6–6.5% (42–48 mmol/mol)**
- **6% (42 mmol/mol) - optimal - achieved without hypoglycemia, but the target may be relaxed to 7% (53 mmol/mol) if necessary to prevent hypoglycemia (ADA,2019).**

MEDICAL NUTRITION THERAPY

- **Medical nutrition therapy for GDM is an individualized nutrition plan developed between the woman and a registered dietitian familiar with the management of GDM (Viana, Gross, Azevedo, 2014).**
- **Adequate calorie intake for fetal/neonatal and maternal health**
- **Achieve glycemic goals**
- **Promote appropriate gestational weight gain.**

MEDICAL NUTRITION THERAPY

- The food plan should be based on a nutrition assessment with guidance from the Dietary Reference Intakes (DRI).
- The DRI for all pregnant women recommends:
 - Minimum of 175 g of carbohydrate
 - Minimum of 71 g of protein
 - And 28 g of fiber (ADA,2019).
- The amount and type of carbohydrate will impact glucose levels, especially post meal excursions.

GLYCEMIC INDEX OF VARIOUS FOODS

Low glycemic index	Moderate glycemic index	High glycemic index
<ul style="list-style-type: none">• Carrots• Corn• Fruits (most)• Lima beans• Oat bran• Peas• Steel-cut oatmeal• Stone-ground whole wheat bread• Sweet potatoes	<ul style="list-style-type: none">• Brown rice• Couscous• Quick oats• Pita bread• Rye bread• Whole wheat bread• Wild rice	<ul style="list-style-type: none">• Bagel• Bran flakes• Corn flakes• Instant oatmeal• Melon• Pineapple• Popcorn• Pretzels• White bread• White rice

Information from: American Diabetes Association. Glycemic Index and Diabetes [homepage on the Internet]. 2013.

POSTPARTUM FOLLOW-UP

- **37 weeks gestation- long-term risk of developing Type 2 DM after GDM and encouraged to get testing postpartum (Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2016).**
- **Immediate postpartum period- fasting blood glucose (BG) <100 mg/dL**
- **1-hour postprandial BG after eating a "regular" nondiabetic diet <140 mg/dL (AWHONN,2016)**
- **GDM may represent preexisting undiagnosed type 2 or even type 1 diabetes, women with GDM should be tested for persistent diabetes or prediabetes at 4–12 weeks postpartum with a 75-g OGTT (ADA,2019; ACOG,2017).**

PREVENTION OF DIABETES

In persistent hyperglycemia, continued testing is indicated with closer follow-up after discharge, continued home testing, and consideration of implementing medication therapy with insulin at half the third-trimester pregnancy dose or use of oral medication (such as metformin or glyburide) (AWHONN,2016).

Early breastfeeding stabilize newborn blood sugars, aid in maternal weight loss, and decrease risk of developing T2DM (when exclusively breastfeeding) (AWHONN,2016; ADA2019).

SUMMARY

Encourage to follow up with a pcp, made aware of the history of GDM (ACOG, 2017)

- **Impaired glucose metabolism - weight loss and physical activity counseling, medical nutrition therapy, and/or medication therapy with yearly reassessment of glycemic status**
- **Normal range receive weight loss and physical activity counseling, assessment of glycemic status every 1 to 3 years (ACOG; AWHONN, 2016).**
- **The OGTT is recommended over A1C, A1C persistently impacted (lowered) by the increased red blood cell turnover related to pregnancy or blood loss at delivery. OGTT is sensitive at detecting glucose intolerance, including both prediabetes and diabetes (ADA, 2019).**

SUMMARY

Initiating prevention and/or treatment:

- **Delay the onset of T2DM, prevent GDM or adverse outcomes in subsequent pregnancies, and prevent complications from the disease (AWHONN, 2016).**
- **Diet and exercise recommendations should be encouraged to be continued including 30 minutes of exercise per day, especially in obese patients.**

CASE STUDY

- **A 36-year-old Asian-American woman who is in her second pregnancy and has had one live birth and one abortion is seen for prenatal care at 24 weeks gestation. Her height is 5 feet 2 inches & weight 200 lb, Vital signs: BP- 130/80 mmHg,HR-82,RR-20,Temp-97.8 F. Uterine size is appropriate for gestational age. The patient's past obstetric history includes the spontaneous vaginal delivery of a 9 lb, 1 oz. female infant at 38 weeks gestation, 6 years ago. The patient reports that the child is doing well. Her family history reveals that her mother has type 2 diabetes mellitus. A urine dipstick shows 3+ glycosuria and negative ketones.**

QUESTIONS

- **1. What are the risk factors for GDM?**
- **2. How is the diagnosis of gestational diabetes mellitus (GDM) established?**
- **3. What would be the best treatment and follow-up strategy?**

CLINICAL PEARLS

- 1. When patients present with significant risk factors for GDM, early screening for GDM, before 20 weeks gestation, might be undertaken.
- 2. The finding of glycosuria should prompt a random capillary glucose performed immediately and a follow-up fasting venous plasma glucose.

CLINICAL PEARLS

- 3. Given an elevated fasting venous plasma glucose, such patients should be started immediately on diet and insulin therapy and followed with self-monitoring of blood glucose using the criteria recommended by the Fourth International Workshop-Conference on Gestational Diabetes Mellitus.
- 4. Patients treated with not only diet but also insulin are at increased risk for an intrauterine fetal death, and for that reason, antepartum fetal testing with nonstress tests should be performed.

CLINICAL PEARLS

- 5. For such patients who do not enter spontaneous labor, induction of labor at 39 weeks is appropriate.
- 6. Postpartum screening, if there is elevated fasting plasma glucose further testing is needed. Educate the patient to seek prompt treatment.

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QUESTIONS

