Diabetes in Pregnancy: Diagnosis and Treatment

Neil Murphy MD

Indian Health DM Webinar

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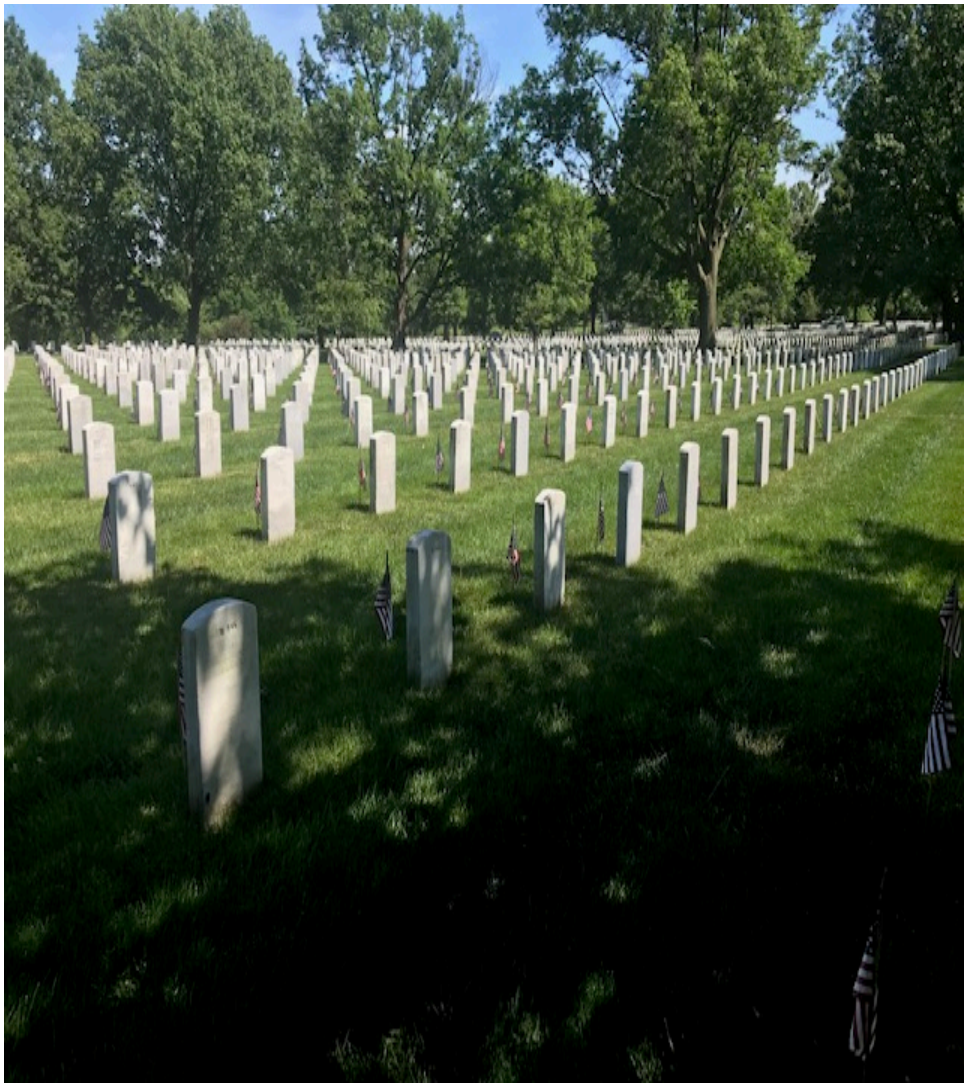
Disclosure

- No conflicts of interest to report
- Acknowledge off-label uses

Objectives

- The learner will be able to:
  - Increase understanding of screening and diagnosis of diabetes in pregnancy
  - Increase understanding of management diabetes in pregnancy
  - Increase understanding of follow up care for diabetes in pregnancy

Diabetes in Pregnancy Pictures (1)



Gestational Diabetes (GDM)?

- Pregnancy: insulin resistance and hyperinsulinemia
- Hormones (growth hormone, cortisol, placental lactogen, progesterone) all boost fetal nutrition
- GDM: maternal pancreatic function isn't sufficient to overcome insulin resistance
- Pregnancy is a diabetes "stress test"

Case Scenario

- SK 38 yo. G8P7006 presents at 13 weeks by her dates
- OB HX 3 infants > 9 pounds
- Last NSVD 10 lb. 8 oz. stillborn
- Difficult labor: Baby's head came out; shoulders didn't want to come out

ADA / IADPSG* System

- First visit
- Evaluate for Overt Diabetes Mellitus

- Add to 1st prenatal labs
  - Random plasma glucose
  - Hgb A1c
  - Or fasting plasma glucose
  - *International Association of Diabetes and Pregnancy Study Groups

1st Prenatal Lab Results

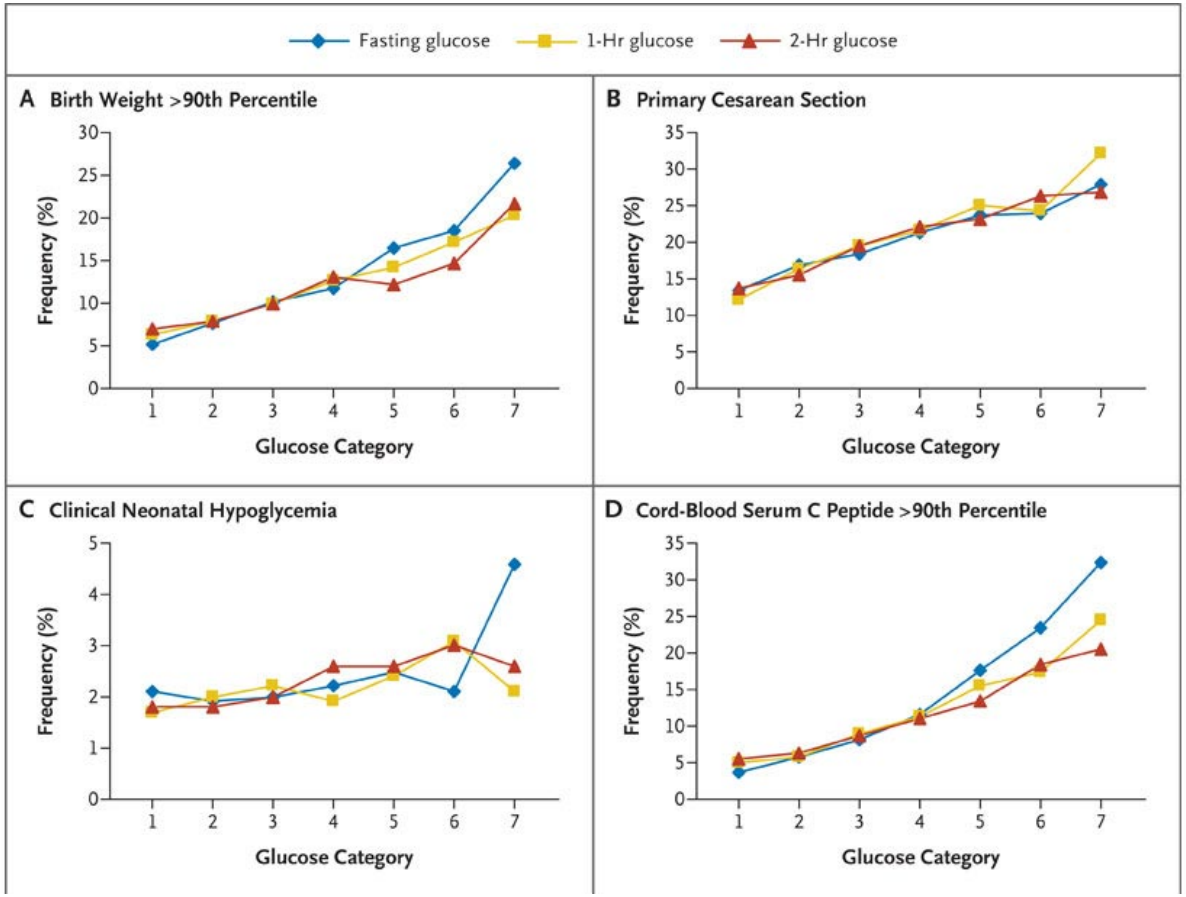
- Overt Diabetes
  - FBS > 126 mg/dl
  - Hbg A1c > 6.5%
  - Random glucose > 200 (+ confirmation)

Hyperglycemia and Pregnancy Outcomes

- 25,505 pregnant women
- 15 centers in 9 countries
- 75-g OGTT at 24 to 32 weeks
- Blinded if….
- Fasting plasma glucose < 105 mg and
- 2-hour plasma glucose < 200 mg

- N Engl J Med. 2008 May 8;358(19):1991-2002

Frequency of Primary Outcomes across the Glucose Categories



The HAPO Study Cooperative Research Group. N Engl J Med 2008;358:1991-2002

24 - 28 Weeks, or Later

- 2 hr. 75 gm OGTT
- Use ADA / IADPSG* criteria
    - *International Association of Diabetes and Pregnancy Study Groups

ADA* / IADPSG

- Fasting ≥ 92 mg/dL or
- One hour ≥180 mg/dL or
- Two hour ≥153 mg/dL

- Only one abnormal value needed (75 gm OGTT)
- * American Diabetes Association

?Revolutionary OGTT criteria?

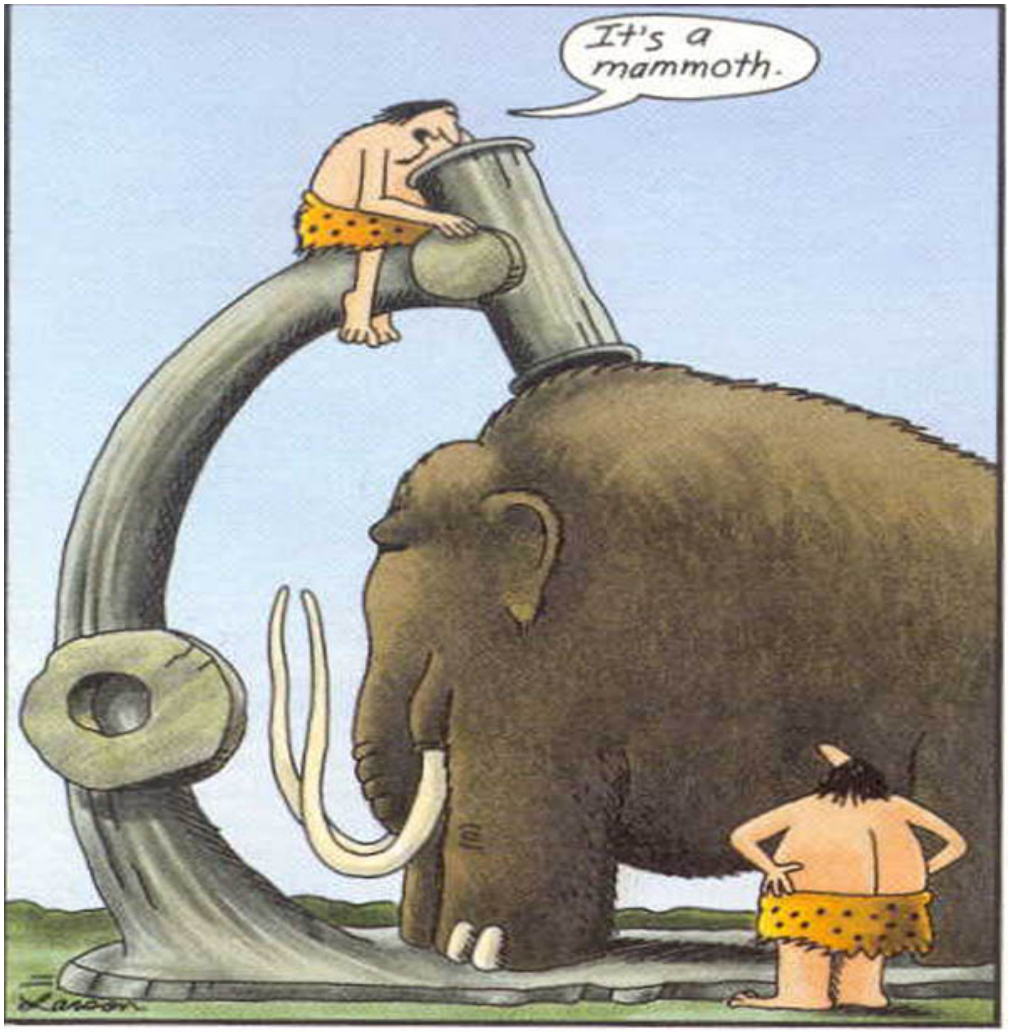
- Carpenter and Coustan
- Fasting 95
- 1 hr. 180
- 2 hr. 155

- Two abnormal values

- ADA / IADPSG
- Fasting 92
- 1 hr. 180
- 2 hr. 153

- One abnormal value

Early Microscopes Cartoon



Early microscopes

Complications of Diabetes in Pregnancy

- GDM
  - Macrosomia and related problems (maternal and fetal)
- Insulin Requiring Diabetes
  - Anomalies
  - Macrosomia
  - Placental insufficiency
    - IUGR
    - Fetal Compromise

Classification

- Pregnancy
  - Pre-gestational: Carbohydrate intolerance diagnosed prior to pregnancy
  - Gestational Diabetes: Carbohydrate intolerance with onset or first recognition during pregnancy

If Abn OGTT, then GDM

- Dietary consult
- Exercise consult
- Home glucose monitoring
- Give a 2-week trial

GDM Classification: A1 vs A2

- FBS > 95 mg/dL.
- 1 hr. pp. > 130 – 140 mg/dL.
- 2 hr. pp. > 120 mg/dL.

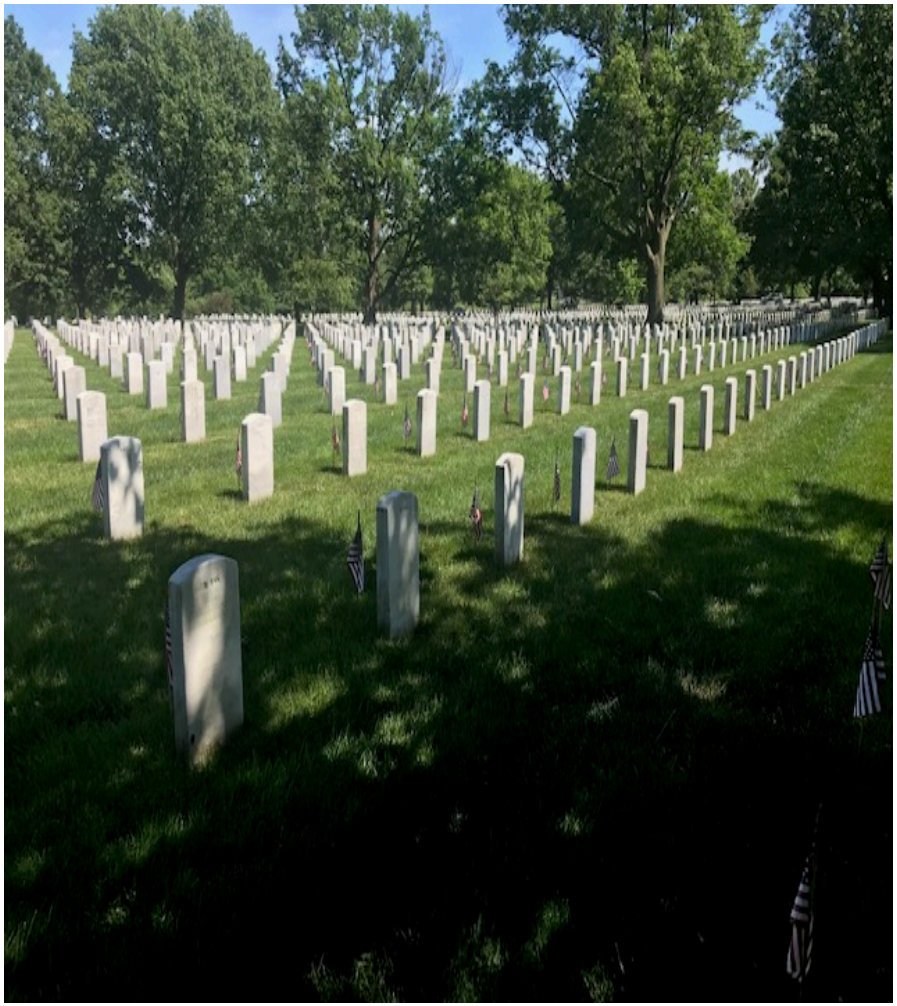
Continuous Glucose Monitors (CGMs) (1)

- 2-week sensor
- Cell phone or reader
- No finger sticks!
- So much data!

Continuous Glucose Monitors (CGMs) (2)

Continuous Glucose Monitors (CGMs) (3)

Diabetes in Pregnancy Pictures (2)



Case Continued (1)

- Mrs. K's 2-hour glucose tolerance test showed:
  - FBS 98 mg/dL
  - 1 hour 198 mg/dL
  - 2-hour 189 mg/dL

Management

- Management of pre-gestational diabetes and insulin requiring GDM is more intensive because of increased risk to the fetus
- Approximately 90% of GDM patients are non-insulin requiring

Initiating Therapy

- Medical Nutrition Therapy (MNT)
  - 50 – 90% can be managed with MNT
  - Limit carbohydrates to 35 – 45% of total caloric intake
  - Utilize complex carbohydrates
  - Culturally appropriate food choices
- Exercise
  - Lowers fasting and postprandial glucose levels
  - Aerobic, 30minutes, 5x/week

Diet

- Viana et al systematic review and meta-analysis of RCTs, n = 884
- Low glycemic index (GI) versus
- Total energy restriction versus
- Low carbohydrates

- Low GI reduced insulin use and BW
- Diabetes Care. 2014 Dec;37(12):3345-3355.

GDM A1 - Follow-up

- Glucose Monitoring - Home versus Clinic
  - Insulin if FBS > 95, 2hr > 120, 1 hr. > 140*
- Fetal kick counts
- Repeat Ultrasound at 28-32 weeks
- Delivery at 41 0/7 weeks

Case Continued (2)

- Mrs. K returns after 2 weeks on diet and exercise therapy with this glucose log
  - FBS: 98-121
  - 2 hr. pp 131-203
  - 2 hr. pp lunch 123-129
  - 2 hr. pp dinner 122-128

The Diabetes in Pregnancy “Team”

- Case Manager
- Diabetes Educator
- Nutritionist
- Exercise Specialist
- Maternity Care Provider
- Antenatal Testing Staff
- Ultrasound Technologist
- Traditional Healer
- Lactation and Family Planning Educators

Medication Requiring - Initial

- Diet
- Exercise
- Assess renal function (Level B)
- Eye exam (Level B)
- Re-education
- Ultrasound
- ? EKG
- ?HgAlc

Pharmacologic Therapy

- Goal is euglycemia
- Home monitoring is essential
  - FBS < 95 mg/dL
  - 2 hours post prandial < 120 mg/dL
  - 1 hour pp < 130 -140 mg/dL
    - (Level I data)

Initiation of Insulin Therapy

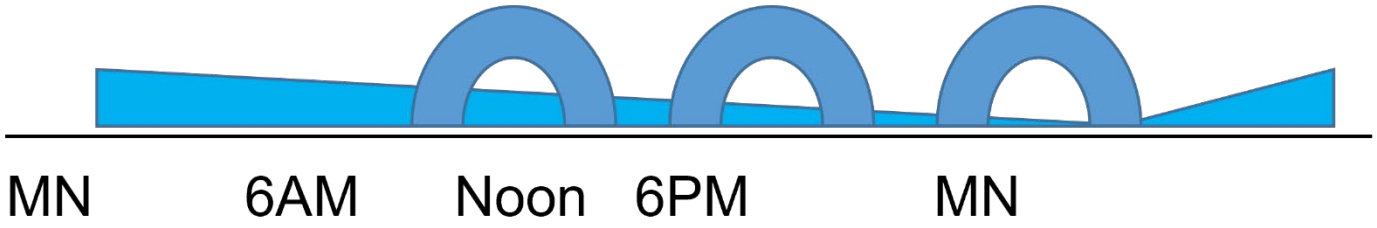
- Single dose of long acting
  - (e.g., 20u NPH), or
- 0.7 units/kg in divided doses
  - (2/3 and 1/3)
- May be as high as 1.5 – 2 units /kg in morbidly obese women
- Goal is euglycemia (80+% at target)

Insulin

- Various regimens, no clear best approach:
- Novolog and NPH in am and pm combined doses
- Novolog and NPH (Novolog & NPH before breakfast; Novolog before dinner; NPH at bedtime)
- Novolog pre-meal with Basal Insulin

Detemir Regimen

- Pre-meal Novolog and Bedtime Detemir



Oral Agents: Metformin

- Multiple studies
- Start low and slow: GI side effects
- Perhaps even 250 mg day to start
- Goal 1500 – 2000 mg /d
- Need insulin too – 35-50%

    - Not FDA approved, Class B

Oral Agents: Glyburide

- + crosses the placenta
- 16-40% may require insulin added
- 2.5 mg - 20 mg
- 2018 ACOG: “Not recommended as first-choice pharmacologic treatment because, in most studies, it does not yield equivalent outcomes to insulin”
    - Not FDA approved, Class C

Oral Agents: Meta-analysis

- Metformin results in a lower rate of macrosomia than use of glyburide
  - Minus 209 g
- Metformin users are more likely to require supplemental insulin to maintain euglycemia than glyburide users
  - 4 -16% vs 33%
  - Balsells BMJ 2015

Oral Agents: Comparison

- Metformin
- First choice, if you have time:
- Start low, go slow
- High rate of needing insulin
- Crosses placenta – please caution pt
- See glyburide comparison

Comparison: Glyburide

- Single agent
- Conflicting data
  - Transplacental passage
- Versus insulin: macrosomia, neonatal wt, neonatal hypoglycemia
- Versus metformin: above plus more maternal weight gain

FDA Approved?

- Oral agents = not FDA approved
- Both are endorsed by ACOG and ADA with cautions

- DOCUMENT:
  - Insulin offered as first-line and recommended therapy
  - Glyburide/metformin discussed, including placental transfer, unknown long-term effects, lack of FDA approval

Antenatal Follow-Up: Class A2 (1)

- Visits q 2-4 weeks till 36 weeks
- Home glucose monitoring
- Fetal echo/Level II ultrasound at 18-22 weeks (if pregestational)

Antenatal Follow-Up: Class A2 (2)

- Antepartum testing at 32 weeks*
- Visits q week after 36 weeks
- Delivery 39 weeks, if good control
- Delivery 38 weeks, if ‘issues’

- *if adequate control (>90% in range), may just do kick counts till 36 weeks

Intrapartum Management

- GDM - Non-medication requiring
  - Routine
- Medication requiring
  - Goal: 70-110 to avoid neonatal complications
  - Monitor q 1-4 hours
  - Monitor for ketonuria q void
  - Insulin/dextrose as needed

Case Continued (3)

- Mrs. K cervical ripening scheduled at 38 wks.
- Insulin drip
- NSVD 8 lb. 2 oz girl Apgars of 9 and 9
- Baby's heel-stick glucose is 42 mg/dL
- Above 40 mg/dL hourly over the next 4 hrs.

Post Partum - General Concepts

- Non pregnant “normal” levels higher
- “Honeymoon” period - insulin requirements markedly decreased
- Lactation decreases Type 2 DM
- Glucose drops on average 60 mg/dL with breastfeeding episode

Immediate Post Partum (1)

- Non-medication requiring
  - Routine
- Medication requiring
  - Monitor FBS, 2° PP
  - Reinstitute insulin conservatively
  - Follow-up in 1-2 weeks to adjust insulin / change to oral hypoglycemic

Post Partum - 6 weeks

- 75 gm, 2 hr. OGTT
- Fasting > 126 mg/dL and/or 2 hr. > 200 mg/dl*
- Impaired fasting glucose > 100 and < 126**
- Impaired glucose tolerance > 140 and <200**
  - * Diabetes ** Pre-diabetes

Immediate Post Partum (2)

- Hospital glucose monitoring:
  - A1 No monitoring
  - A2 24 hours of F / 2hr PP monitoring
  - DM Ongoing F/PP monitoring

  - ** Use non-pregnant goals: F < 126 & Post-meal <200

- Medications
  - A2 Usually no medication required (*Consider Metformin)
  - DM Anticipate insulin needs to drop by 50%

Post Partum

- Alternative, slightly less accurate
  - FBS
    - > 126 x2 - Diabetes
    - 100-125 - Impaired fasting glucose
      - (Pre-diabetes)
    - <100 - Normal

Post Partum - Long Term

- GDM: q 3-year glucose screening
- Lifestyle modification
- Preconceptual counseling
- Contraception
- Offspring risks

Family Planning

- OCPs
- Depo-Provera
- IUD
- All barrier methods
- Sterilization

Pre-Conception Counseling

- Folic acid
- Maintain euglycemia / SABs (Level B)
- Avoid teratogens
- Healthy behavior
- Safer sex

Recurrence Risk GDM

- 33 – 50% with subsequent pregnancies
- Obese women who lost at least 10 pounds pre-pregnancy decreased their risk of GDM by 40%
- Obese women who gained 10+ pounds pre-pregnancy increased their risk of GDM by 50%

Long Term Follow Up (1)

- Subsequent pregn.: 1/3
- IGT: 20% in early f/u
- Metabolic Synd.: 1/3 at 5-10 yrs.
- Type II
  - 15 mo. 4.9%
  - 5 yr. 13.1%
  - 9 yr. 18.9%

Long Term Follow Up (2)

- > 70% in studies to 28 years postpartum
- No differences between ethnic groups
- Incidence increased most in first 5 yrs.
- Plateau after 10 yrs.
- Elevated fasting increased future risk

- Kim C et. Al. Gestational diabetes and the incidence of type 2 diabetes: a systematic review. Diabetes Care 2002

10 Yr. Follow-Up: DPP

- History of GDM: Intensive Lifestyle Interventions (ILS) and metformin reduced progression to diabetes by 35% and 40%
- No GDM: ILS reduced the progression to diabetes by 30%, and metformin did not
  - Consider offering metformin to A2 GDM

- Aroda et al. J Clin Endocrinol Metab. 2015 Apr;100(4):1646-53

Bonus Track

- 300 GDM pts enrolled in a prospective cohort
- 2-day PP OGTT have similar diagnostic value as 4- to 12-week PP OGTT in predicting DM at 1 yr. with nearly 100% adherence
- Similar ROC curves in identifying DM at 1 year after delivery.
- SMFM.Am J Obstet Gynecol 2020 Sep;223(3):439.e1-439.e7.