

# **Gestational Diabetes**

## **There Are Some Frustrations**



**Most cases identified are  
mild in nature  
Patients don't like the  
OGCT or 3-hr GTT  
Really counseling patients  
is time-consuming  
Patients are reluctant to  
check BGs  
Do we make a difference?**

# **MFMU Network Randomized Treatment Trial of Mild GDM**

- **Multicenter randomized trial of women with**
  - Abnormal 50 g OGC
  - 3-hr GTT → GDM, but
  - Normal FBS on 3-hr GTT
- **Subjects randomized to**
  - Usual care (GTT results not available)
  - Dietary intervention, SBGM, and insulin if required

Landon et al, N Engl J Med 2009; 361:1339

# Gestational Diabetes

## Effect of Treatment

Outcome	Treated (N=485)	Routine Care (N= 473)	P value
Death	0	0	0.12
Hyperbili- rubinemia	43 (10%)	54 (13%)	
Hypoglycemia	62 (16%)	55 (15%)	0.75
Elevated cord C-peptide	75 (18%)	92 (23%)	0.07
Birth trauma	3 (<1%)	6 (1%)	0.33
<b>Composite</b>	<b>149 (32%)</b>	<b>163 (37%)</b>	<b>0.14</b>

# Gestational Diabetes

## Effect of Treatment

Outcome	Treated (N=485)	Routine Care (N=473)	P value
Birthweight	3,302 ± 502	3,408 ± 589	<0.001
LGA	34 (7.1%)	66 (14.5%)	<0.001
Macrosomia	28 (5.9%)	65 (14.3%)	<0.001
Fat Mass (g)	427 ± 198	464 ±	<0.003

222  
Landon et al, N Engl J Med 2009; 361:1339

# Gestational Diabetes

## Effect of Treatment

Outcome	Treated (N=485)	Routine Care (N= 473)	P value
GHTN - PE	41 (9%)	62 (14%)	0.01
Cesarean	128 (27%)	154 (34%)	0.02
Shoulder dystocia	7 (1.5%)	18 (4%)	0.02

Landon et al, N Engl J Med 2009; 361:1339

# **MFMU Network Randomized Treatment Trial of Mild GDM**

<b>Outcome</b>	<b>Number Needed to Treat</b>
<b>Macrosomia</b>	<b>12</b>
<b>Cesarean Delivery</b>	<b>14</b>
<b>Shoulder Dystocia</b>	<b>40</b>
<b>PE+GHTN</b>	<b>20</b>

Landon et al, Am J Obstet Gynecol 2009; 199:S2

# Diabetes in Pregnancy

## Do we make a difference?



Offspring → childhood  
obesity and DM  
Mothers → type 2 DM



# **MFMU Network Treatment Trial of Mild GDM**

## **Childhood Follow-up**

- **Follow-up of 500 (55%) children (ages 5-10) from MFMUN treatment trial**
  - **Physical parameters and BP**
  - **Fasting glucose and insulin**
  - **Triglycerides**
  - **HDL cholesterol**

**Landon et al. Diab Care 2014**



# MFMU Network Treatment Trial of Mild GDM

## Childhood Follow-up

Group	Treated (N=264)	Untreated (N=236)	Adj RR (95% CI)
BMI >85 percentile for age and sex	86 (32.6%)	91 (38.6%)	0.88 (0.71-1.10)
Waist circ >90 <sup>th</sup> percentile for age/sex/ethnicity	31 (11.7%)	27 (11.4%)	1.05 (0.65-1.69)
Impaired FBG	12 (5.7%)	13 (7.2%)	0.76 (0.36-1.62)
Elevated Triglycerides	38 (18.2%)	29 (16.0%)	1.11 (0.71-1.72)
Low HDL cholesterol	27 (13.0%)	22 (12.2%)	1.03 (0.61-1.76)
HBP >95 <sup>th</sup> percentile for age/sex/height	30 (11.5%)	23 (9.8%)	1.23 (0.74-2.05)

# **MFMU Network Treatment Trial of Mild GDM**

## **Maternal Follow-up**

- **Follow-up of 457 (50%) mothers from MFMUN treatment trial (at 4.5-10 yrs)**
  - **Physical parameters and BP**
  - **Fasting glucose and insulin**
  - **Triglycerides**
  - **HDL cholesterol**
  - **OGTT (75 g)**

# MFMU Network Treatment Trial of Mild GDM

## Maternal Follow-up

Group	Treated (N=229)	Untreated (N=201)	P Value or Adj RR (95% CI)
BMI	29.4 (28.6-30.3)	29.1 (28.2-30.0)	0.59
Waist circ (cm)	96.2 (94.3-96.1)	94.2 (92.2-96.3)	0.11
Hip circ (cm)	108.4 (106.7-110.1)	106.8 (105.1-108.7)	0.16
Diabetes	21 (9%)	17 (8%)	1.03 (0.56-1.92)
Metabolic syndrome	73 (32%)	69 (34%)	0.96 (0.73-1.26)

Casey et al. SMFM, 2015

# Gestational Diabetes

## Do we make a difference?

- Identification and treatment of GDM associated with
  - Modest reductions in birthweight / fat mass / LGA / macrosomia / GHTN-PE / shoulder dystocia 😊
  - Possible reduction in CS 😊
- Childhood and post-delivery maternal outcomes are not altered 😞

# Gestational Diabetes

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- **Recent controversy in GDM diagnosis:**
    - **IADPSG and ADA versus ACOG and NIH Consensus Panel**
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# Screening Strategy for GDM

- All women “whether by ...medical history, clinical risk factors, or laboratory screening test....”
- Laboratory screening
  - 50 g glucose challenge → 1 hour venous glucose
    - Threshold of 135 or 140
    - 3 hour diagnostic OGTT

# Screening Strategy for GDM

Status	Plasma or Serum Serum Glucose (Carpenter and Coustan)	Plasma Glucose (NDDG)
Fasting	95	105
1 hour	180	190
2 hour	155	165
3 hour	140	145

ACOG Practice Bulletin 137, August 2013

# IADPSG Screening Strategy for GDM

- **One-step approach**
  - 75 g, 2 hour OGTT
- **GDM diagnosis if any one threshold met or exceeded**

Status	Threshold Glucose
Fasting	92
1 hour	180
2 hour	153



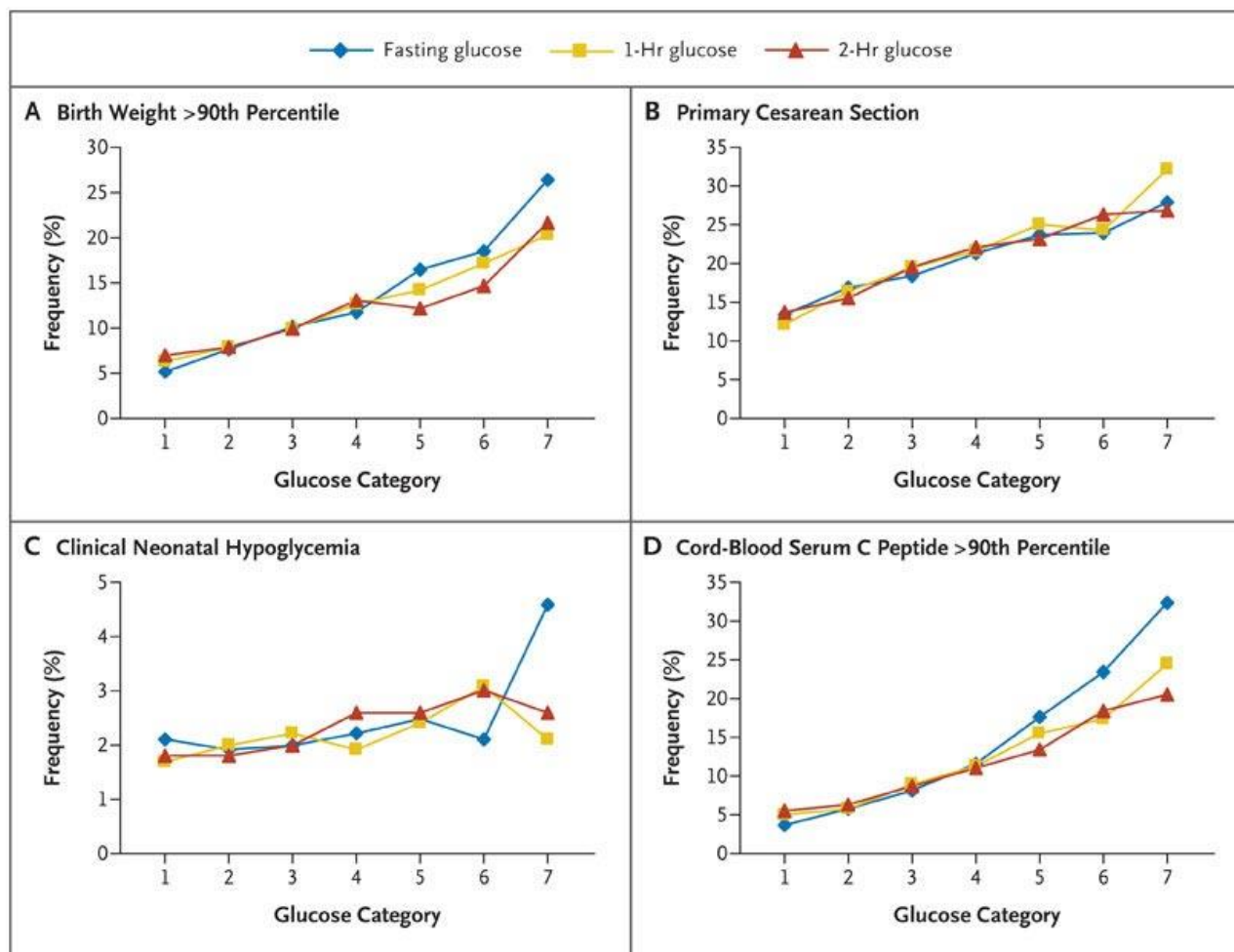
# IADPSG Screening Strategy for Diabetes in Pregnancy

- **FBG or HgbA1c at first prenatal visit**
  - $\geq 126$  or 6.5%  $\rightarrow$  overt diabetes
  - 92-125  $\rightarrow$  GDM
  - $< 92$   $\rightarrow$  75 g OGTT at 24-28 weeks

# HAPO Study

- Prospective, observational study of 23,316 pregnant women
- 75 g OGTT→7 glucose categories
- Primary outcomes
  - LGA
  - CS
  - Neonatal hypoglycemia
  - Cord C-peptide

# Frequency of Primary Outcomes across the Glucose Categories



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



The NEW ENGLAND  
JOURNAL of MEDICINE

# IADPSG Screening Strategy for GDM

- One-step approach
  - 75 g, 2 hour OGTT
- GDM diagnosis if any one threshold met or exceeded

Status	Threshold Glucose
Fasting	92
1 hour	180
2 hour	153

Based on glucose levels associated with 1.75-fold increased risk of LGA, neonatal body fat >90<sup>th</sup>%tile, & ↑cord insulin

# Implication

- **HAP0→IADPSG recommendation would result in nearly 20% of the population being diagnosed with GDM!**

# **Pros for IADPSG Recommendations**

- **Based on 2 randomized trials**
  - **~30% to 60% reduction in adverse outcomes**
- **In HAPO (23,316 pregnancies), dx and treatment would**
  - **Prevent 140 cases of LGA, 21 SDs, and 16 birth injuries**
- **Potential for long-term health improvements related to patient education in pregnancy**

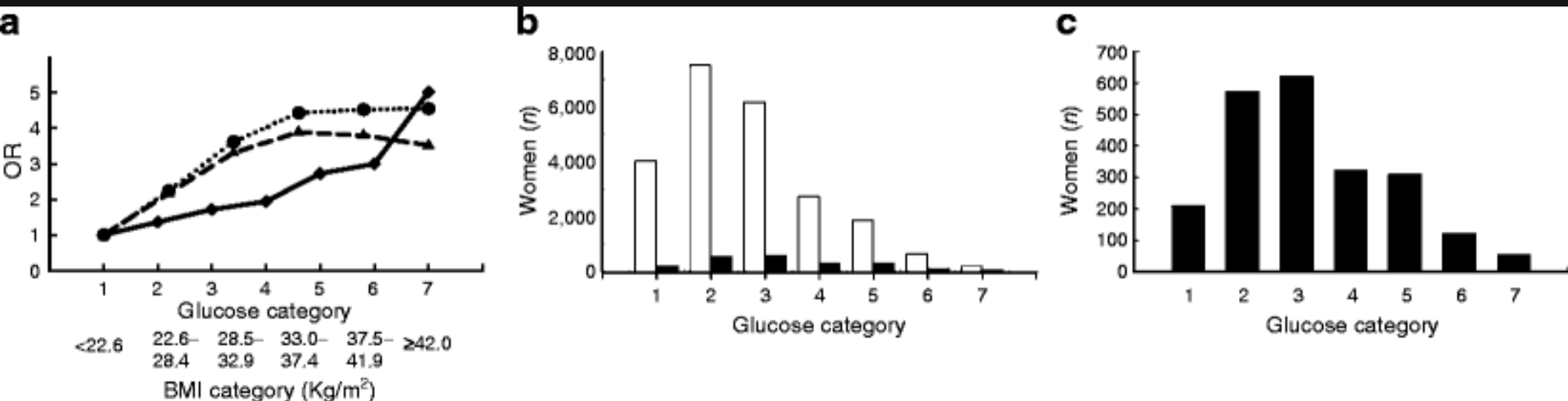
# Cons for IADPSG Recommendations

- High percentage of population diagnosed with GDM
  - But would only prevent 140 cases of LGA, 21 SDs, and 16 birth injuries
- Reproducibility of 75 g OGTT suboptimal
  - 25% could be reclassified
- “Treatment” in real-world may not be practical or effective

# Cons for IADPSG Recommendations

- Unintended consequences of “overmedicalization”
  - Inductions and early delivery
- Costs > benefits?





Ryan EA. Diabetologia 2011;54:480

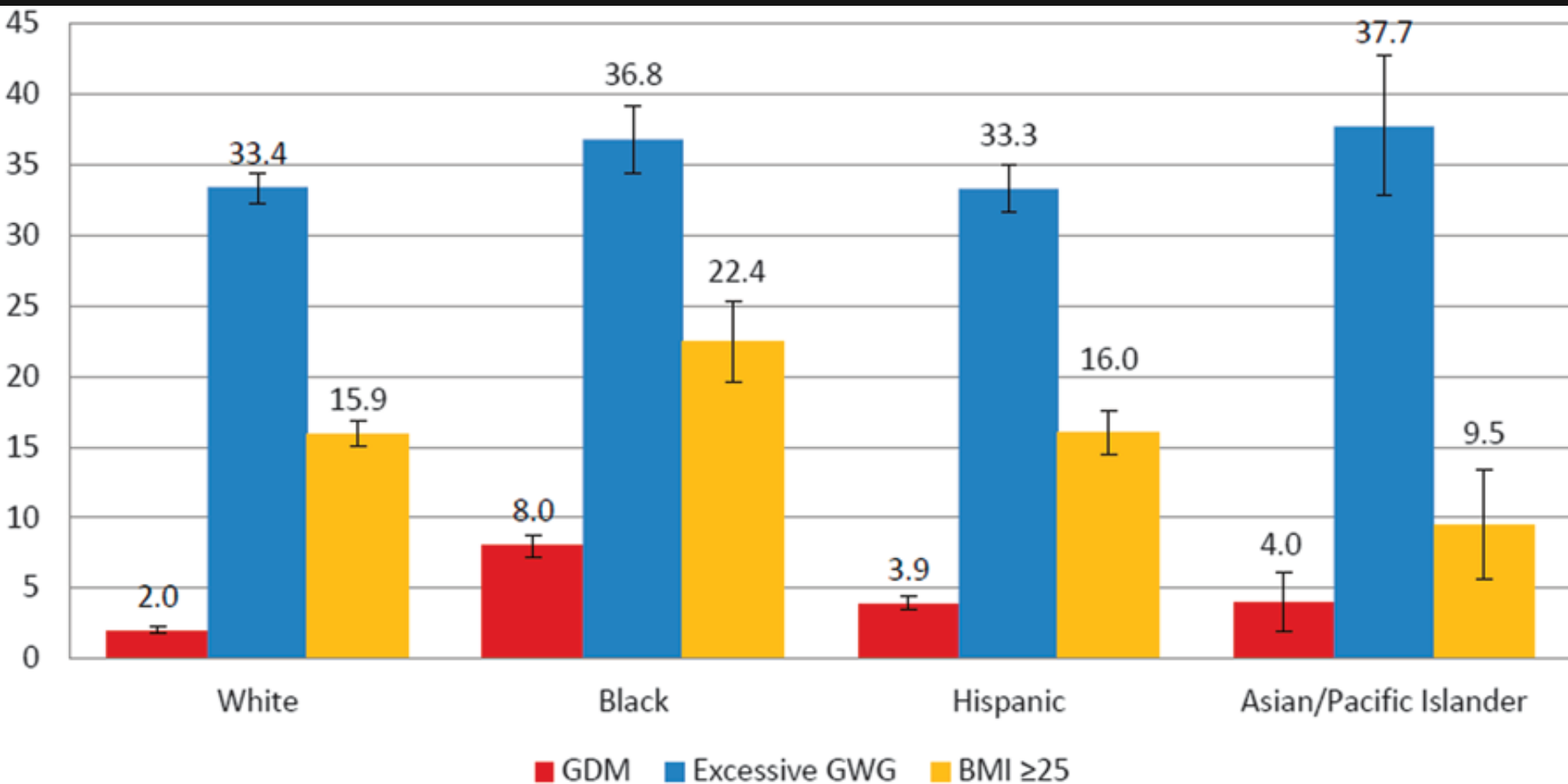
# Diagnosing GDM?

- Both glucose and BMI predict LGA
- In HAPO, 78% of LGA infants were born of women without IADPSG GDM diagnosis!
- BMI is more relevant except at highest glucose levels

# Obesity?



# Prevalence of LGA for Births at 37-41 Weeks



Pre-Pregnancy BMI Category (Body Mass Index = BMI)	Recommended Total Weight Gain During Pregnancy	
BMI < 18.5 Underweight	12.5 – 18.0 kg	28.0 – 40.0 lbs
BMI 18.5 – 24.9 Normal Weight	11.5 – 16.0 kg	25.0 – 35.0 lbs
BMI 25.0 – 29.9 Overweight	7.0 – 11.5 kg	15.0 – 25.0 lbs
BMI ≥ 30 Obese	5.0 – 9.0 kg	11.0 – 20.0 lbs

Body Mass Index (BMI) = Weight (kg) / [Height (m)]<sup>2</sup>

# Diet and Activity in GDM

- **Carbohydrate intake [should] be limited to 33–40% of calories, with the remaining calories divided between protein (20%) and fat (40%)**
- **A moderate exercise program as part of the treatment plan for women with GDM is recommended**

# Diet and Carbs in GDM

Total Calories	Carbohydrate Calories (@40% of total) / g of carbs	Examples of Daily Carbohydrate Selection
2000 calories per day (1 <sup>st</sup> 6 months of pregnancy)	800 calories 200 g carbohydrates	1 medium fruit, 1 average bread, 1 ½- ¾ cup cereals/grains/potatoes per meal, along with assorted other carbs
2200 calories per day (last 3 months of pregnancy)	880 calories 220 g carbohydrates	Add 1-2 carb servings per day

# Activity in GDM

- **30 minutes of moderate-to-vigorous intensity aerobic exercise at least 5 days a week (150 min per week)**
  - You can talk but not sing
  - You cannot say more than a few words without pausing for a breath



# **Diabetes Management 101**

## **(aka “Coaching”)**

- **Insist on patient self blood glucose monitoring - “you manage what you measure”**
- **Review the results at every patient visit**
- **Suggest ways to improve – coach!**
- **Establish reliable, outcome-oriented referral services**