ACIBADEM ÜNİVERSİTESİ TIP FAKÜLTESİ

Diabetes Mellitus –Pregnancy

Fetal Monitoring- Delivery Time

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TAJEV 2014

Diabetes Mellitus-Pregnancy

- Pregestational DM approximately %1 of all pregnancies
- Rapidly increasing incidence of type 2 pregestational DM
- %90 of diabetes in pregnancy is gestational DM

Diabetes Mellitus-Pregnancy Management

Glucose Control

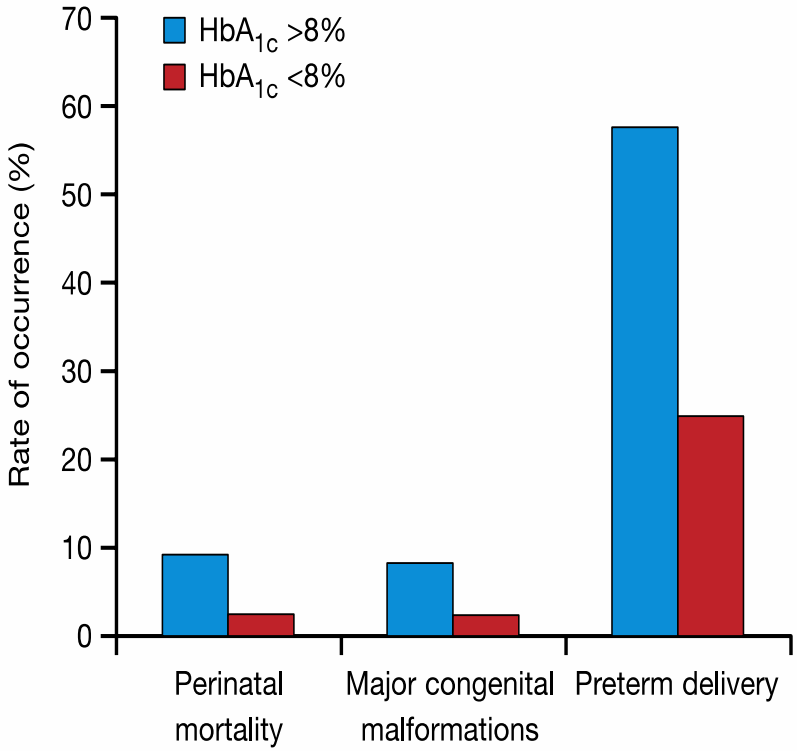
- **First Trimester:** Prevention hypoglisemia, congenital malformation
- **Second- Third Trimester:** Detailed Ultrasound and Fetal assestment
- **Delivery Time**

HbA1C - Pregnancy outcome

- Glysemic control preconceptional and early gestational days with

  < HbA1C

  - Congenital anomalies <%4)
  - Spontaneous abortus (%13,3-10.4)
  - Preterm labor



Diabets and Pregnancy Group
France 2003

Diabetes Mellitus-Pregnancy

Fetal Monitoring

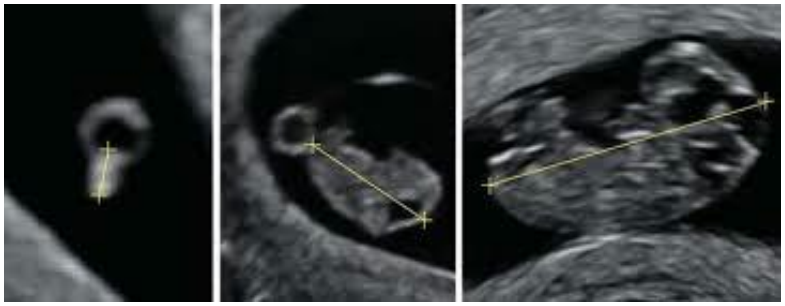
- Associated with increased fetal and neonatal risks

Associated risks	
Spontaneous abortion	As high as %17
Congenital malformation-	X 4-10
Stillbirth-P. Mortality	X 5
Neonatal Mortality	x15
Infant Mortality	X 3
Macrosomia	
Gestational DM	% 20
Pre-existing DM	% 35

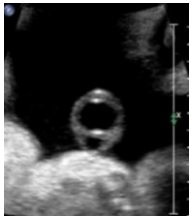
Fetal Monitoring?

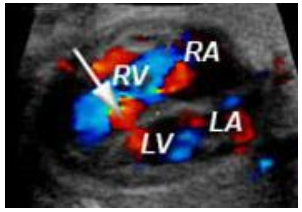
Ultrasound

- Determine accurate gestational age



- Identified fetal anomalies





- To rule out fetal growth abnormalities

Main Goal of Antepartum Surveillance

- Being avoidance of fetal deaths
- Early detection of fetal compromise
- Prevention of unnecessary premature birth

Which Tests To Use?

Kick Counts

- Fetal limb, body and breathing movements correlate to maternal glucose concentration

- Low or failing levels of fetal movements are associated with abnormal CTGs and fetal distress similar to hypoxic fetus of non diabetic women

Roberts et al 1980

Which Tests To Use?

Kick Counts

- Inexpensive easy to perform
  - Poorly define
  - No aggreement as to instruction given to women
  - 10 movements /2 h

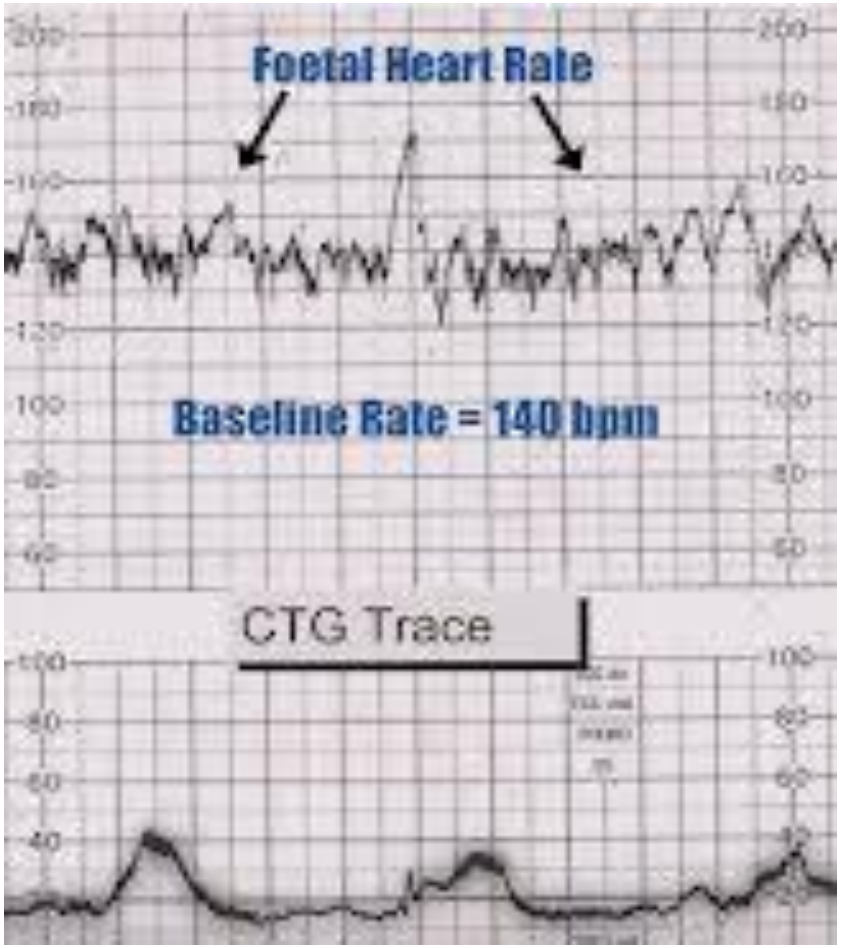
Stiilbirth rate drop from 8.2 to 2.1 /1000 live births

Moore et al AJOG 1989

Which Tests To Use?

NST

- A reactive NST reassuring 99% survive for 7 days
- High false positive rate
- %50 reactive < 28wks , 85 % beyond 28-32wks
- In DM 2 times/wks



Kersen et al

Which Tests To Use?

NST

There was no significant difference identified in potentially preventable deaths

(RR 0.23, 95% CI 0.04 to 1.29, two studies, N = 469)

There is no clear evidence that antenatal CTG improves perinatal outcome

Cochrane Database 2012

Fetal demise and poor outcome have been reported hours after a normal trace

False negative CTG findings are more commonly reported in diabetic than in nondiabetic pregnancies

Shaxted EJ Obstet Gynecol 1981

Which Tests To Use?
Computerised CTG

- 26 women with type 1 DM in third trimester compared with uncomplicated pregnancies
  - 28-39 weeks cCTGs weekly
  - 11.3 % showed absent episodes with the expected value of 0.8%
  - Differences in the short term variation, basal heart rate, frequency of fetal mavement, hearth rate acceleration.
- **Correlation between FHR pattern and maternal glysemic control**
- **Relevance of this to the risk of fetal demise has not beeen determined**
  - **Tincello et al Br.J.Obstet Gynecol 2001**
  - **Tincello et al J. Perinat Med. 1998**

Which Tests To Use?

BPP

- BPP (Fetal breathing, movement, tone, AFI) /30 minute
  - 8-10 reassuring
  - 6-7 reevalution with in day
  - 0-4 suggest hypoxemia
- Modified BPP (NST+AFI)

Which Tests To Use?

BPP

Twice weekly modified BPP was an effective method of fetal assesment to prevent stiilbirth with a rate of 1.4/1000

Kjos et al AJOG 1995

Good ppv (%95) at determining an APGAR score of >7 at 1 and 5 min. However poor predictive value and sensitivity for adverse fetal outcome .

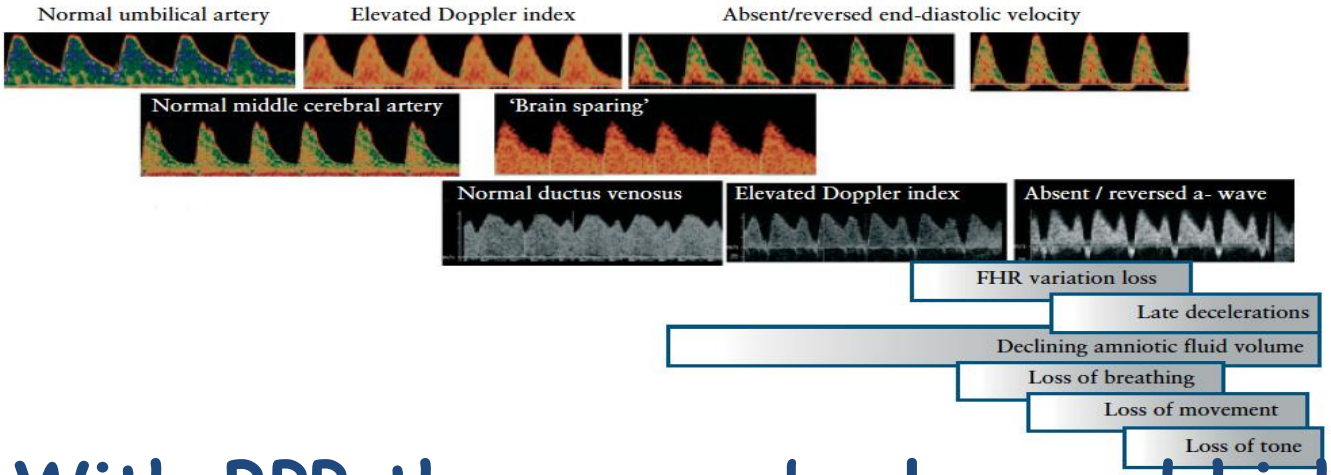
Dicker et al. AJOG 1988

Diabetic Pregnancies have a higher false – negative rates than other high risk pregnancies

Which Tests To Use?

Doppler Studies

- Umblical artery Doppler will be normal
- MCA Doppler redistrubition
- Ductus Venosus hypertrophic cardiomyopathy



With BPP there may be lowered high incidence false negative tests

Which Tests To Use?

Limitation in predictive power of many fetal monitoring methods and lack of RCT

Indivulized according to clinics and patients in various combinations

The frequency of iu deaths excluding congenital malformations 3.0/1000

Preexisting Diabetes-Stillbirth (3%)

- Approximately 50 % after 36 weeks
- Usually after 32 weeks

CEMACH 2005

	Type 1 diabetes (n = 1706)		Type 2 diabetes (n = 650)			
	Frequency (n)	Rate (95% CI)	Frequency (n)	Rate (95% CI)	National rate (n = 620 841)	Rate ratio (95% CI)
Stillbirth[a]	44	25.8 (18.3–33.3)	19	29.2 (16.3–42.2)	5.7	4.7 (3.7–6.0)
Perinatal death[b]	54	31.7 (23.3–40.0)	21	32.3 (18.7–45.9)	8.5	3.8 (3.0–4.7)
Neonatal death[c]	16	9.6 (4.9–14.3)	6	9.5 (1.9–17.1)	3.6	2.6 (1.7–3.9)

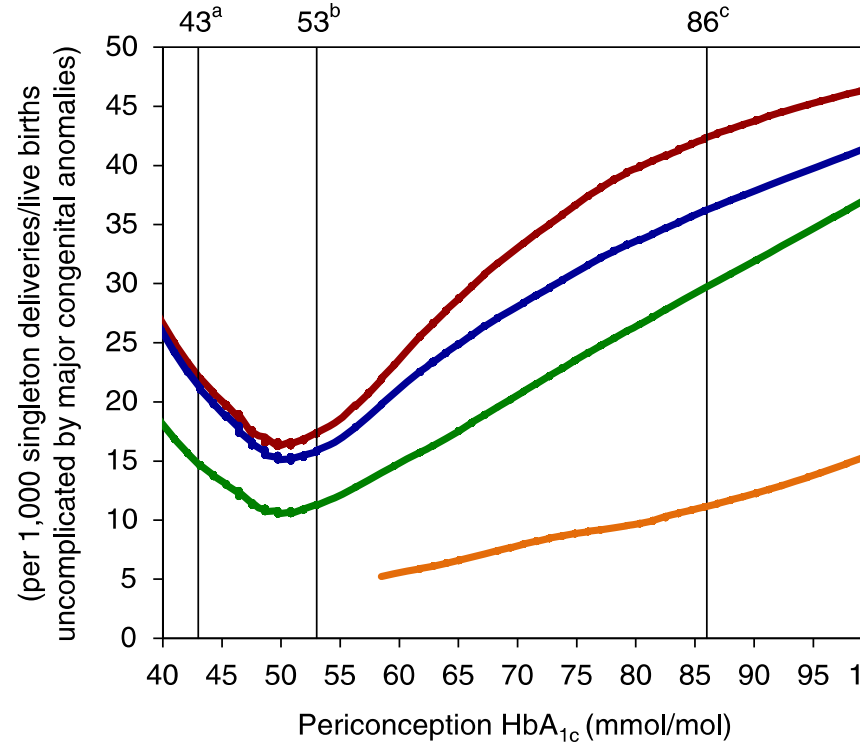
[a]Source for national data: CEMACH, 2002.
[b]Rate per 1000 live births plus stillbirths.
[c]Rate per 1000 live births.

CEMACH Study 2002

What is the optimum frequency of testing?

- Antenatal surveillance safely achieved with a testing sequence that consists of twice weekly NSTs backed up by BPS, CSTs.
  - **Golde et al AJOG 1984**
- 4 deaths in 46 diabetic pregnancies when interval was greater than 4 days
  - **Miller et al et al J Reprod Medicine 1985**

Preexisting DM and Stillbirth



HbA_{1c}	40–49	50–59	60–69	70–79	80–89	90–99
regnancies	236	289	272	183	123	66
etal deaths	3	4	8	9	6	2
fant deaths	0	2	2	1	1	2

- 1,206 with type 1 diabetes and 342 with type 2 diabetes
- Fetal death 4 times greater (RR 4.56 [95% CI 3.42, 6.07], p < 0.0001)
- İnfant death nearly doubled (RR 1.86 [95% CI 1.00, 3.46], p = 0.046)

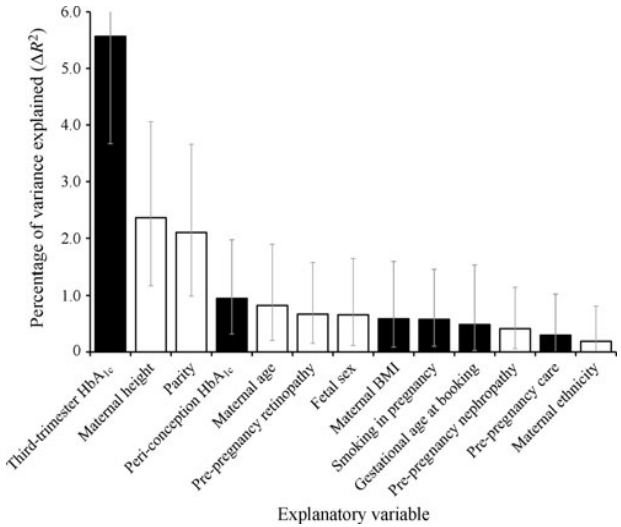
Do all fetusus need testing?

- Stillbirth is correlated by glysemic control
- Perinatal asphyxia correlated by
  - PA HT
  - Smoking
  - Fetal macrosomia
  - Maternal hypoglisemi before delivery

FETAL SURVEİLLANCE İS REQUİRED WHEN THESE COMPLİCATİONS ARE FOUND IN DİABETİC PREGNANCY

DM and Birthweight

Birthweight ↓	Birthweight ↑
Peri-conception HbA1c	Pre-pregnancy care
Smoking	Third-trimester HbA1c
Later gestation at first antenatal visit	Increasing maternal BMI
Prepregnancy nephropathy retinopathy	Longer maternal height

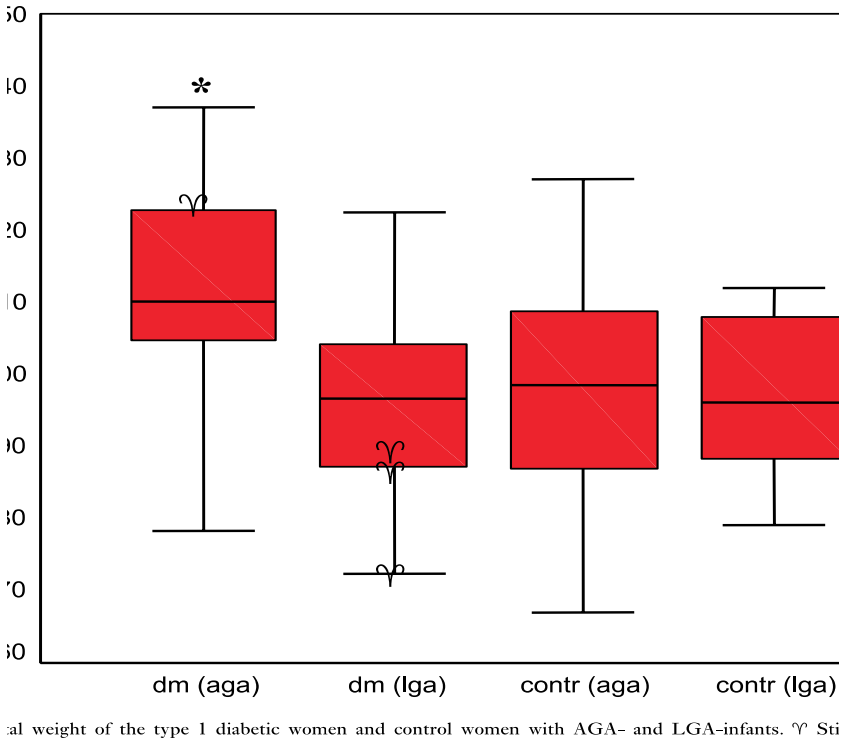


Population based cohort study: n-1505

Glinianaia et al Diabetelogia 2012

Diabetes –Placental Changes

- Histopathological changes
  - nRBCs
  - Fibrinoid necrosis
  - Villous immaturity
  - Chorangiosis
- Placental weight



al weight of the type 1 diabetic women and control women with AGA- and LGA-infants. ♈ Sti

AGA-infants of diabetic women may be protected against hypoxemia because of a relative high placental weight

Evers et al 2003

Type I DM and PAPP-A

	Control	Type I DM
n	36415	331
PAPP-A	1.01	0.86
Free Beta hcg	0.99	0.98

Significant inverse relationship between HbA1C and PAPP-A

Madsen et al Acta Obstet Gynecol 2011l

Increase in Fetal Macrosomia

20-50%

- Increase in maternal obesity
- Lower incidence of maternal vascular complications
- Poorer control in advanced pregnancy weeks

Timing of Delivery- Mode of Delivery

- Risk of Stillbirth
- Risk of shoulder dystosia and intrapartum asphyxia

Diabetes- Shoulder Dystosia

Ratio	Weight
5-23.1%	4000-4500
20-50%	>4500

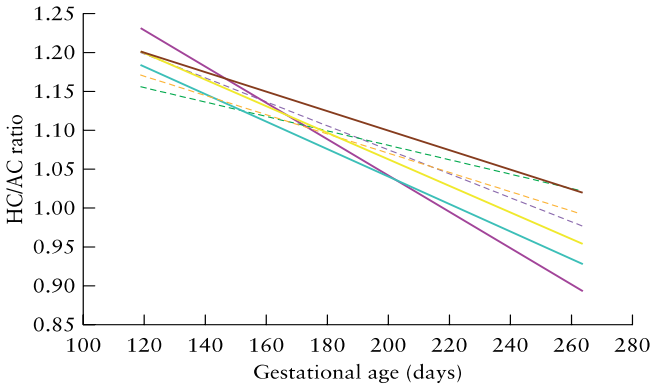


Figure 4 Head circumference/abdominal circumference (HC/AC) ratio in diabetes mellitus Type-1 (DM1), diabetes mellitus Type-2 (DM2) and gestational diabetes mellitus (GDM) pregnancies, subdivided according to non-macrosomia (birth weight < 90th percentile) and macrosomia (birth weight ≥ 90th percentile).
---, DM1 non-macrosomia; —, DM1 macrosomia;
---, DM2 non-macrosomia; —, DM2 macrosomia;
---, GDM non-macrosomia; —, GDM macrosomia; —, controls.

Hammoud- Visser et alUOG 2013

- Wide range of sensitivities and specifities for identifying macrosomia
- Serial USG may provide a more accurate estimation
  - Thung et all Clin. Obstet Gynecol 2013

Timing of Delivery

Depends on types of Diabetes – associated risk factors and Glysemic Control

Mode of Delivery

- Concerning mode of delivery be initiated when fetal weight >4500
  - ACOG
- May avaiable >4000g

  Thung et al. Clin. Obstet Gynecol

Conclusions

Gestational Age	Fetal Testing
First Trimester	Dating ultrasound
18-20 wks	Detailed anatomic survey
22 wk	Fetal echocardiography
Third trimester	Serial Growth US
32 wk	NST 2 times /wks ins requiring DM
38 wks	Significant risk factor delivery
39-40 wk	Deliver ins requiring DM
40 wk	NST for Diet controlled DM
41 wk	Deliver diet-controlled DM

- Don’t Forget Case by Case Determination

Thank you for your kind attention!