Antenatal Fetal Assessment

Objectives:

Describe how to test for each of the following:

-Fetal well-being
-Fetal growth
-Fetal movement
-Amniotic fluid
-Fetal lung maturity

★ **Resources used:**
Slides, Kaplan
Explanation
Important

MNEMONICS AVAILABLE!

★ **Editing file**

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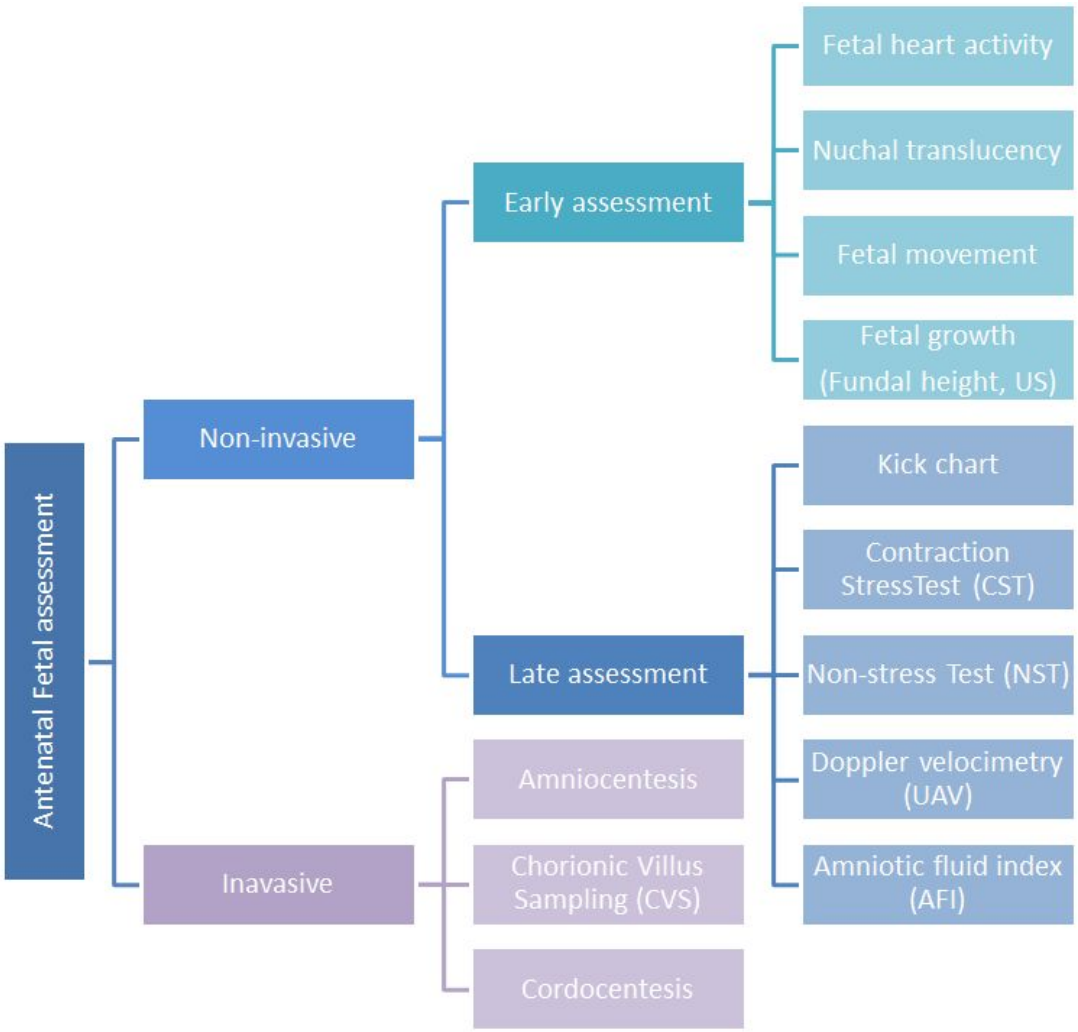
Fetal Assessment (Fetal well-being)

- Fetal assessment is to identify fetuses at risk of **neurologic injury** or **death** in order to prevent it
- To prevent prenatal mortality & morbidity



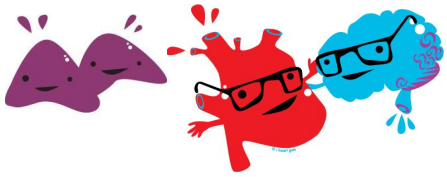
Fetal and neonatal complications of antepartum asphyxia

- Stillbirth (Mortality)
- Metabolic acidosis at birth
- Hypoxic renal damage
- Necrotizing enterocolitis
- Intracranial hemorrhage
- Seizures
- Cerebral palsy

Conditions associated with increased perinatal morbidity/mortality

- Small for gestational age fetus
- Decreased fetal movement
- Postdates pregnancy (>294 days)
- Pre-eclampsia/chronic hypertension
- Pre-pregnancy diabetes
- Insulin requiring gestational diabetes
- Preterm premature rupture of membranes
- Chronic (stable) abruption

Rational



Fetal oxygenation challenged:

- Blood flow directed to brain, heart and adrenal glands
- Blood flow away from the kidneys ⟶ decrease fetal urine production ⟶ decrease amniotic fluid (AF) volume.
- CNS hypoxia ⟶ Fetal movement decrease
- Chemoreceptors ⟶ vagally-mediated reflex ⟶ Fetal heart rate abnormality late deceleration.

When to start fetal assessment antenatally?

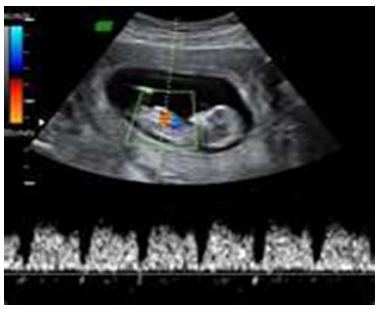
Fetal assessment is done once or twice weekly
Risk assessed individually:

Case	Week
Uncomplicated DM	32 weeks onward
Complicated DM	24 weeks onward
Post date pregnancy	40 weeks
Decreased fetal movement	Start immediately

Early pregnancy assessment

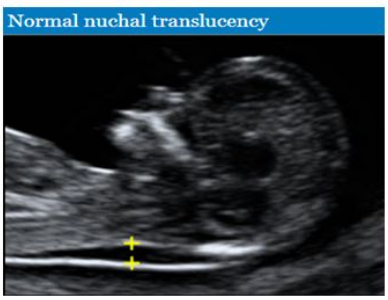
Fetal heart activity

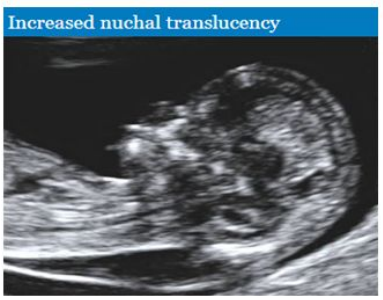
- fetal auscultation (special stethoscope or Doppler) ~12 weeks
- fetal heart activity seen by US (can be seen from 6 weeks):



Nuchal translucency

- Ultrasound to measure the thickness of the fluid buildup at the back of the developing baby's neck.
- measurement for early screening for chromosomal abnormality such as down syndrome, trisomy 18
- Between 11-13+ weeks



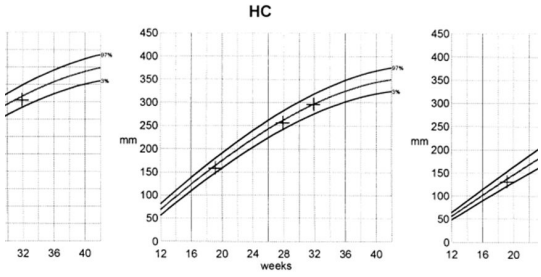


Fetal movement

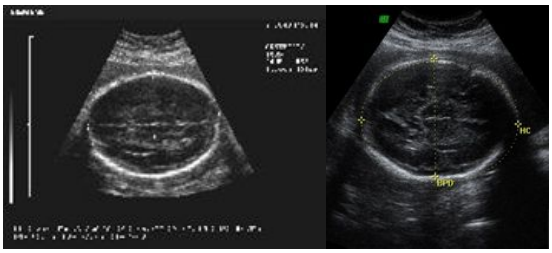
- Fetal movements are usually first perceptible to mother ~17w-20w (quickening)
- 50% of isolated limb movements are perceived
- 80% of trunk and limb movements

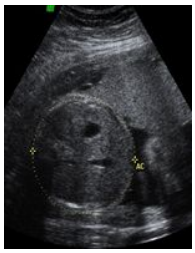
Fetal growth

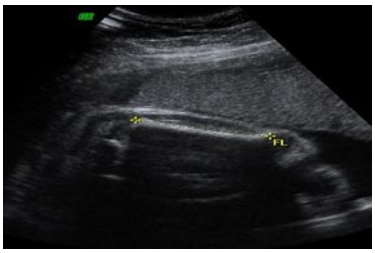
- By fundal height measurement in the clinic
- By ultrasound:
- **Biometry**:
  - Biparietal diameter (BPD)
  - Abdominal Circumference (AC)
  - Femur Length (FL)
  - Head Circumference (HC)
- **Amniotic fluid**



Growth Chart


Biparietal diameter (BPD)


(AC)


Femur Length (FL)

Late pregnancy assessment

Fetal movement counting (kick chart)

- It should be started ~28w in normal pregnancy &~24w in high risk pregnancy
- It can reduce avoidable stillbirth

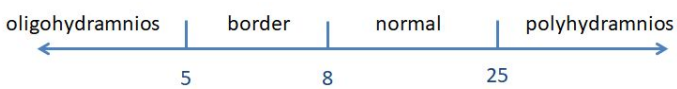
CARDIFF TECHNIQUE
- 10 movements in 12 hours
- If abnormal patient should get further assessment

SADOVSKY TECHNIQUE
- 4 movement/hour, if not felt, another hour
- If not, patient needs more assessment

Amniotic Fluid Index (AFI) (Kaplan)

The 4-quadrant amniotic fluid index test assesses in centimeters the deepest single vertical amniotic fluid pocket in each of the 4 quadrants of the uterus. The sum of the pockets is known as the amniotic fluid index, or AFI. Interpretation is as follows:

<5 cm ⟶ oligohydramnios
5-8 cm ⟶ borderline
9-25 cm ⟶ normal
> 25 cm ⟶ polyhydramnios



Non Stress Test (NST) (Kaplan + Lecture)

This test assesses the frequency of fetal movements using and external fetal heart rate (FHR) monitoring device to detect the presence or absence of accelerations. These are abrupt increases in FHR above the baseline lasting <2 min and are **unrelated to contractions.** The criteria vary by gestational age:

- <32 weeks, the increase should be ≥10 beats/min lasting ≥10 s
- >32 weeks, the increase should be ≥15 beats/min lasting ≥15 s

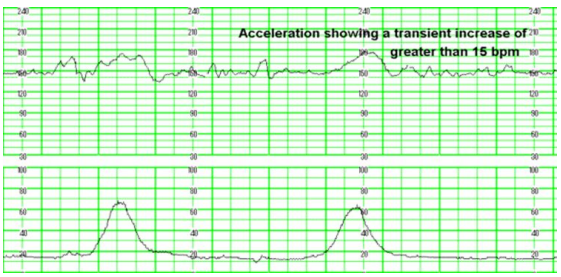
They are mediated by the **sympathetic** nervous system and always occur in response to **fetal movements.**
Interpretation: **accelerations are always reassuring.** (check the pic at the bottom of the page)

- **Reactive**: At least two accelerations from baseline of 15 bpm for at least 15 sec within 20 minutes
- **Non reactive**: No acceleration after 20 minutes- proceed for another 20 minutes
    - If non reactive in 40 minutes---proceed for contraction stress test or biophysical profile
    - The positive predictive value of NST to predict fetal acidosis at birth is 55%
- Main advantage over CST: no need for contraction
- False +ve and false -ve is higher than CST
- The base line 120-160 beats/minute

Reactive NST	**Criteria:** ≥2 accelerations in 20 min: ↑ FHR ≥15 beats/min and lasting ≥15 seconds
	Assessment: reassuring of fetal well-being
	Follow-up: repeat weekly/biweekly
Nonreactive NST	**Criteria:** no FHR accelerations or did not meet criteria
	Assessment: sleeping, immature, or sedated fetus; acidotic, compromised fetus?
	Follow-up: Vibroacoustic Stimulation (VAS)
	If still NR: do contraction stress test (CST) or biophysical profile (BPP)

Cardiotocography (CTG) interpretation

Normal Baseline FHR 110–160 bpm
Moderate bradycardia 100–109 bpm
Moderate tachycardia 161–180 bpm
Abnormal bradycardia < 100 bpm
Abnormal tachycardia > 180 bpm



Acceleration

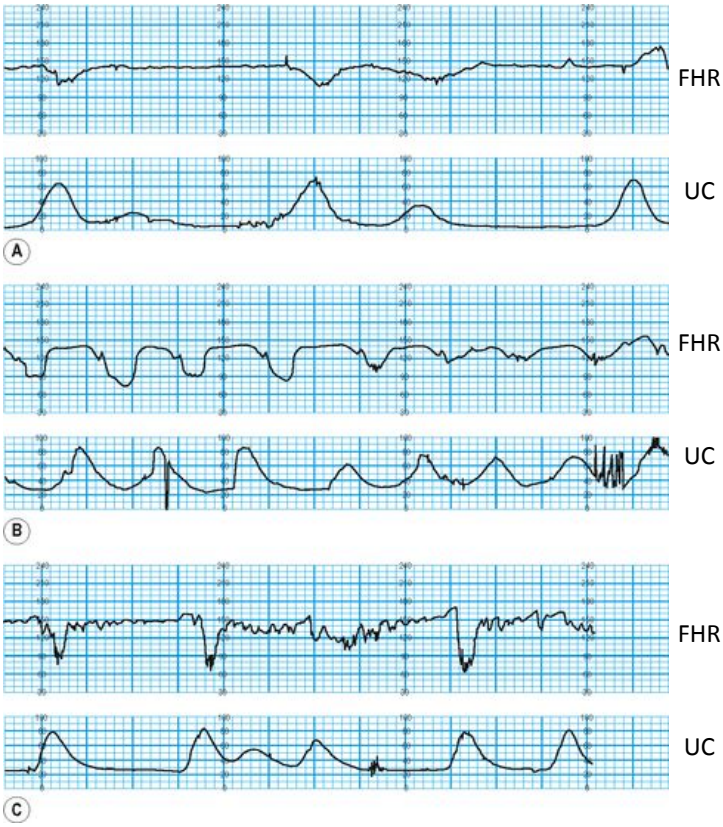
A visually apparent abrupt increase (onset to peak in <30 seconds) in the FHR mediated by sympathetic nervous system.

Deceleration

A- EArly deceleration → hEAd compression
Gradual decrease and return of the FHR associated with a uterine contraction (UC).
Mediated by **parasympathetic** stimulation.
Mirror image of contraction.

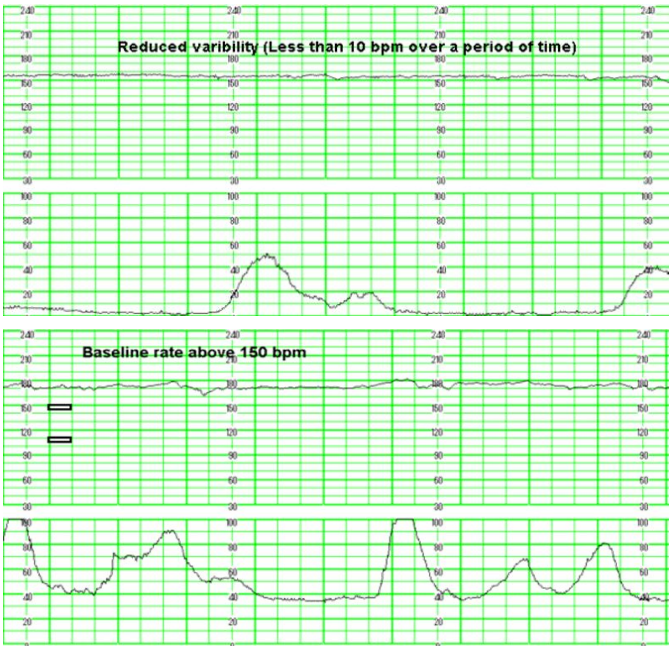
B- LAte deceleration → uteropLAcental insufficiency
Gradual decrease and return of the FHR associated with a uterine contraction (UC).
Mediated by **vagal** stimulation or myocardial depression.

C- VariaBLe deceleration → umBLical cord compression or 1ry CNS dysfunction
Abrupt decrease and return of the FHR.
Variable in relation to contractions.



Reduced variability
Baseline variability: fluctuations in the baseline FHR that are irregular in amplitude and frequency. It is a reflection of the autonomic interplay between the sympathetic and parasympathetic nervous system

Tachycardia:
Hypoxia, Chorioamnionitis, Maternal fever
B-Mimetic drugs, Fetal anaemia, sepsis, heart failure, arrhythmias

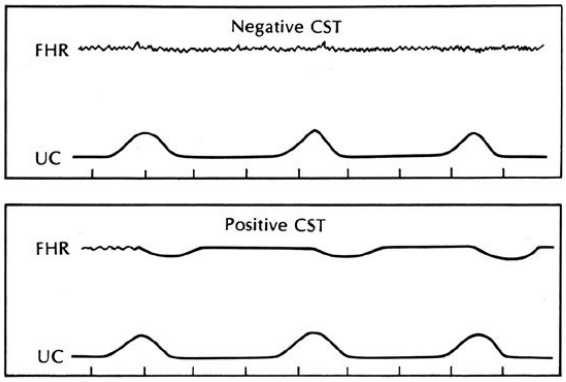


Contraction Stress Test (CST)

This test assesses the ability of the fetus to tolerate transitory decreases in intervillous blood flow that occur with uterine contractions. It uses both external FHR and contraction monitoring devices and is based on the presence or absence of **late decelerations**.

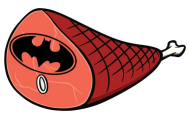
Unlike the NST where spontaneous contractions happen, here, uterine contractions are induced by giving oxytocin

- Causing uterine contraction over 20minutes
- At least 2 uterine contractions
- Uterine contraction restrict O2 delivery to the fetus
- Normal fetus will tolerate contraction
- Hypoxic fetus will have late deceleration
- High false positive rate ~50%
- 100% true negative rate



Negative CST	No **late decelerations** are seen in the presence of 3 uterine contractions in 10 min
	Assessment: reassuring of fetal well-being
	Follow-up: repeat CST weekly as needed
Positive CST	Repetitive **late decelerations** are seen in the presence of 3 uterine contractions in 10 min
	Assessment: worrisome, especially if nonreactive non-stress test
	Follow-up: prompt delivery

Biophysical Profile (BPP)



A **complete BPP** measures 5 components of fetal well-being: **"BAT HAM"**
Breathing, **A**mniotic fluid volume (AFV), **T**one, **H**eart rate + **A**ccelerations (NST), **M**ovements

- Combines NST with USS estimation AFV, fetal breathing, body movement and reflex /tone/ extension-flexion movement.
- It is a scoring system done over 30 minute
- measures acute hypoxia (NST, body mov. & breathing) & chronic hypoxia (AFI)
- The risk of fetal death within 1 week if BPP is normal~ 1/1300

Modified BPP (mBPP) includes only the NST and AFV

- low false negative 0.8/1000
- high false positives ~60%

Biophysical profile cont.

variables	normal score = 2	abnormal score = 0
fetal breathing movements	≥1 episodes in 30 min each lasting ≥30 sec	absent or no episode ≥30 sec in 30 min
gross body movements	three or more discrete body or limb movements in 30 min (episodes of active continuous movement = a single movement)	less than 3 episodes of body or limb movements in 30 min
fetal tone	≥1 episodes of active extension with return to flexion of fetal limb(s) or trunk; opening and closing of hand is considered normal tone	slow extension w/return to flexion, movement of limb in full extension, or fetal movement absent
reactive fetal heart rate	≥2 episodes of accelerations (≥ 15 beats/min) in 20 min, each lasting ≥ 15 sec and associated with fetal movement	< 2 episodes of accelerations or acceleration of < 15 beats/min in 20 min
qualitative amniotic fluid volume	≥1 pockets of fluid measuring > 1 cm in 2 perpendicular planes	pockets absent or pocket < 1 cm in 2 perpendicular planes

- Score of **8 or 10** → highly **reassuring** of fetal well-being
  - Management: repeat test weekly or as indicated
- Score of **4 or 6** → **worrisome**
  - Management:
  - if the fetus is ≥36 weeks → delivery
  - if the fetus is <36 weeks → repeat biophysical profile in 12-24 hours
- Score of 0 or 2 → highly predictive of fetal hypoxia with low probability of false positive
  - Management: prompt delivery regardless of gestational age

Doppler velocimetry/Umbilical Artery doppler

This test measures the ratio of systolic and diastolic blood flow in the umbilical artery. The umbilical circulation normally has low resistance, so significant diastolic blood flow is expected.
It is predictive of poor perinatal outcome only in IUGR fetuses. Nonreassuring findings, which may indicate need for delivery, are absent diastolic flow and reversed diastolic flow.

- Measurement of blood flow velocities in maternal & fetal vessels
- Reflect feto-placental circulation
- Doppler indices from UA, Uterine A & MCA
- Doppler studies is mostly valuable IUGR
- In IUGR absent or reversed EDF (end diastolic flow) associated with fetal hypoxia

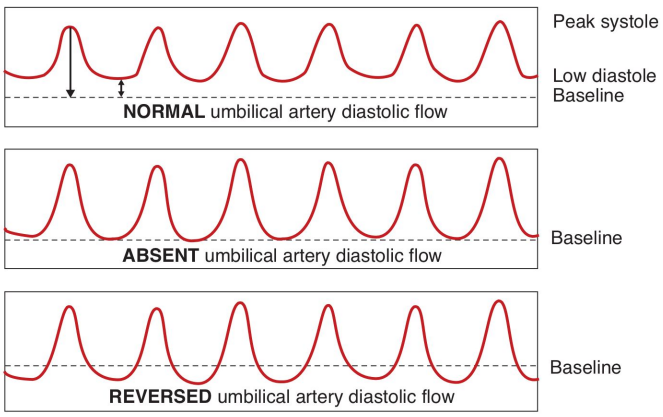
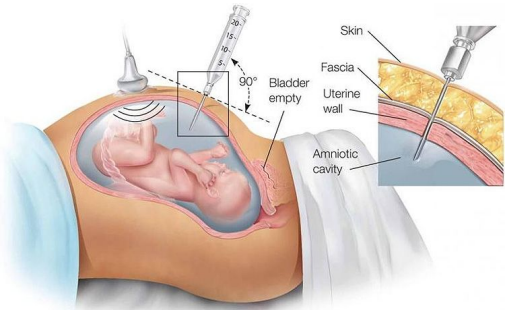


Figure I-12-3. Umbilical Artery Doppler Waveform Patterns

Invasive fetal assessment (Check kaplan chapter 3, pg 31-34)

Amniocentesis

- Obtaining a sample of amniotic fluid during pregnancy.
- Usually done after 15w (can be done after 11w)
- Indications
    - genetic (karyotype)
    - bilirubin level (RH-isoimmunisation)
    - fetal lung maturity (L/S)
    - therapeutic in polyhydramnios
- Risks: ROM ~1%, abortion 0.5%, infection 1/1000



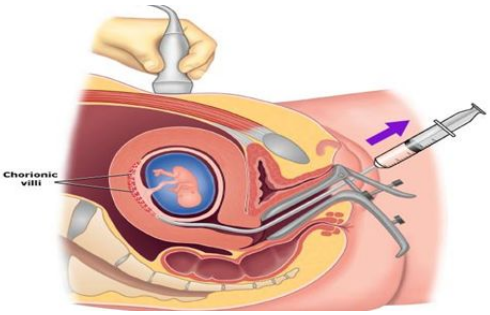
Amniocentesis

Chorionic Villus Sampling (CVS)

- Usually done after 10w
- It is the procedure of choice for first trimester prenatal diagnosis of genetic disorders
- Complication: fetal loss (**0.7 percent within 14 days of a TA CVS procedure and 1.3 percent within 30 days),** Procedure-induced limb defects
- Second trimester amniocentesis is associated with the lowest risk of pregnancy loss; chorionic villus samplings safer than early (i.e, before 15 weeks) amniocentesis.

Cordocentesis

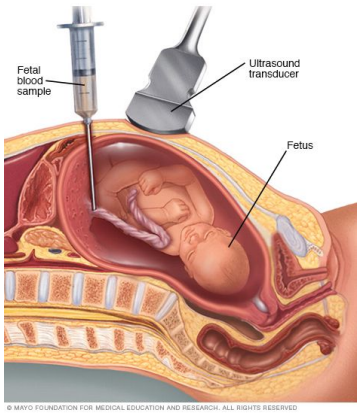
- Indications:
    - rapid karyotyping
    - diagnosis of inherited disorders
    - fetal HB assessment
    - fetal plt level
    - fetal blood transfusion
- Complication: bleeding, bradycardia, infection….



Chorionic Villus Sampling (CVS)

Fetal Lung Maturity (FLM)

- A test for fetal lung maturity is performed before semi-elective but medically indicated births <39 weeks
- Tests for fetal lung maturity are generally not performed before 32 weeks of gestation
- RDS develops as a consequence of surfactant deficiency and immature lung development.
- L/S ratio is the most commonly used (ratio should be 2:1)



Cordocentesis

Fetal Lung Maturity cont.

FLM testing may have value in the following clinical situations:

- Premature rupture of membranes (≥32 weeks) – if FLM test is mature, delivery is likely safer than "wait and see" approach
- Assessment of need for NICU – possible only if early delivery has medical mandate and time allows for FLM testing
- Other selected late preterm and early preterm pregnancy issues where FLM may guide management of at-risk pregnancy

Comparison of FLM Laboratory test options:

All tests require amniocentesis for obtaining amniotic fluid

Lamellar body count (LBC)	Phosphatidylglycerol (PG)	Lecithin-sphingomyelin ratio (L/S)
•Initial FLM of choice •Rapid, sensitive •New data indicates that one can estimate risk of respiratory distress syndrome (RDS) as a function of gestational age and LBC	•Not useful unless gestational age ≥35 weeks •Limited availability •Sensitive	•Main role is in adjudication of immature LBC or PG •Last test of choice •Labor intensive, imprecise •Limited availability •Results take >24 hrs unless performed at a local laboratory

Indications for antepartum fetal surveillance:

Maternal
Antiphospholipid syndrome
Poorly controlled hyperthyroidism
Hemoglobinopathies
Cyanotic heart disease
Systemic lupus erythematosis
Chronic renal disease
Type 1 diabetes mellitus
Hypertensive disorders

Pregnancy complications
Preeclampsia
Decreased fetal movement
Oligohydramnios
Polyhydramnios
Intrauterine growth restriction
Postterm pregnancy
Isoimmunization
Previous unexplained fetal demise
Multiple gestation

وبس..
If you like this work, please make dua' for me
If you don't, also make dua' for me :o)