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 -

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

RATIONAL

- fetal oxygenation challenged:

- blood flow directed to brain, heart & adrenal & blood flow away from the kidney ➡ decrease fetal urine production ➡ decrease AF volume.

- CNS hypoxia ➡ Fetal movement decrease

-chemoreceptor's ➡ vegally-mediated reflex ➡

Fetal heart rate abnormality late deceleration.

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

WHEN TO START FETAL ASSESSMENT ANTENATALLY

** Risk assessed individually

**For D.M. fetal assessment should start from 32 weeks onward if uncomplicated

***If complicated D.M. start at 24 weeks onward

**For Post date pregnancy start at 40 weeks

**For any patient with decrease fetal movement start immediately

** Fetal assessment is done once or twice weekly

EARLY PREGNANCY ASSESSMENT

Fetal heart activity

- fetal auscultation (special stethoscope or Doppler)

~12weeks

Nuchal translucency measurement for early screening for chromosomal abnormality Between 11-13+ weeks

- fetal heart activity seen by USS

Can be seen from 6weeks

EARLY PREGNANCY ASSESSMENT

Fetal movement

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

Fetal growth

- Fundal height
- USS

FETAL GROWTH

- By fundal height measurement in the clinic
- By ultrasound

Biometry:

Biparietal diameter (BPD)

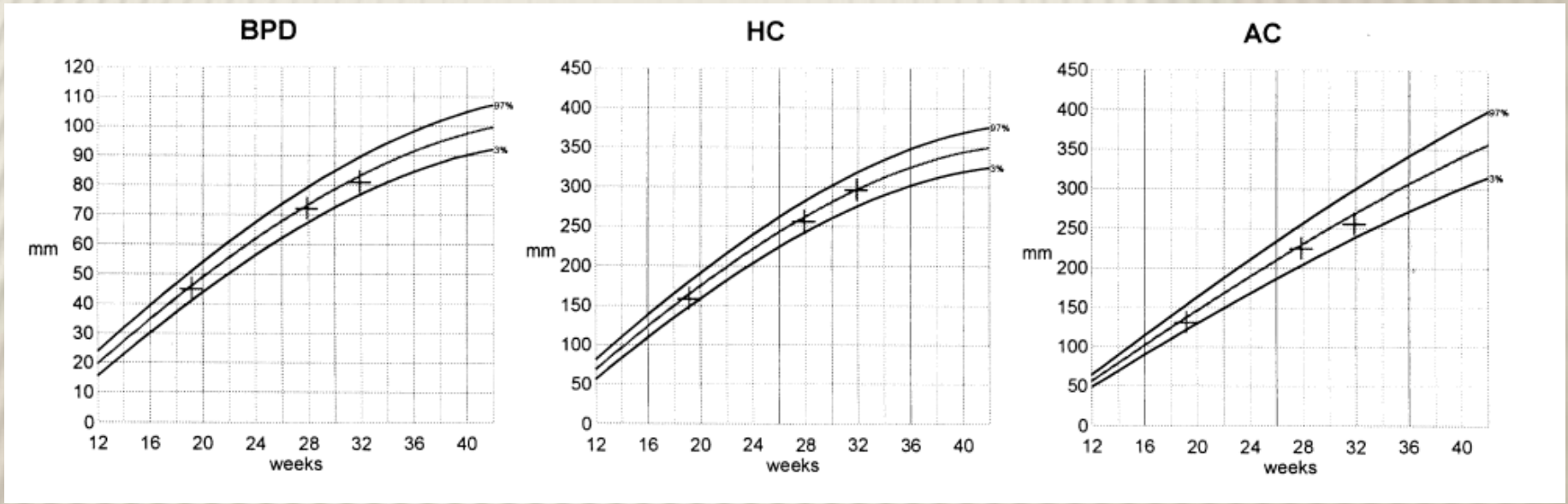
Abdominal Circumference (AC)

Femur Length (FL)

Head Circumference (HC)

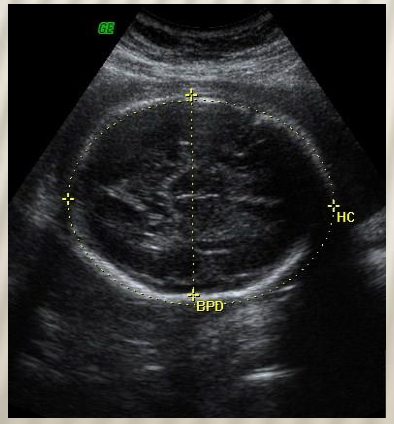
Amniotic fluid

GROWTH CHART

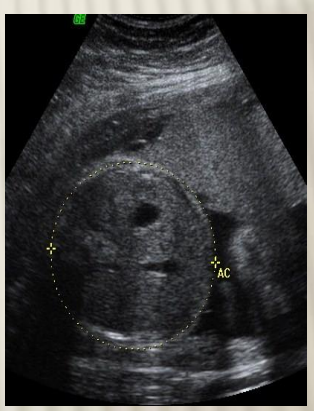


ASSESSMENT OF FETAL GROWTH BY ULTRASOUND

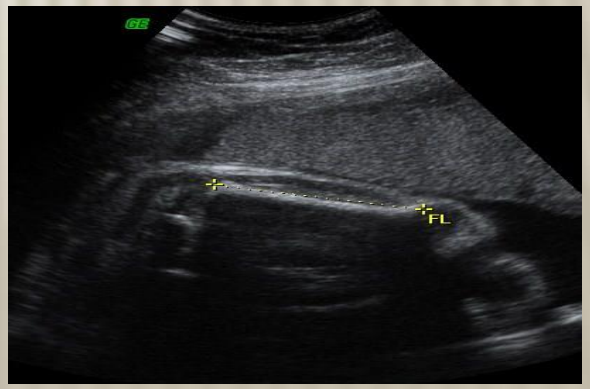
BPD



AC



FL



LATE PREGNANCY ASSESSMENT

- Fetal movement counting kick chart
- Contraction stress test CST
- Non stress test NST
- Doppler Velocimetry UAV
- amniotic fluid index AFI

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

Adapted from data in American College of Obstetricians and Gynecologists. Antepartum fetal surveillance. Practice Bulletin #9, October 1999.

FETAL MOVEMENT COUNTING

- It should be started ~28w in normal pregnancy

&~24w in high risk pregnancy

- It can reduce avoidable stillbirth

CARDIFF TECHNIQUE

-10 movement in 12 hours

-If abnormal patient should get further assessment

SADOVSKY TECHNIQUE

-4 movement/hour if not felt another hour

If not patient need more assessment

CONTRACTION STRESS TEST (CST)

- 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

NON STRESS TEST (NST)

- Main advantage over CST is no need for contraction
- False +ve & false –ve higher than CST
- done

NON STRESS TEST

- The base line 120-160 beats/minute
- Different criteria in fetuses <32w

Reactive:

At least two accelerations from base line of 15 bpm for at least 15 sec within 20 minutes

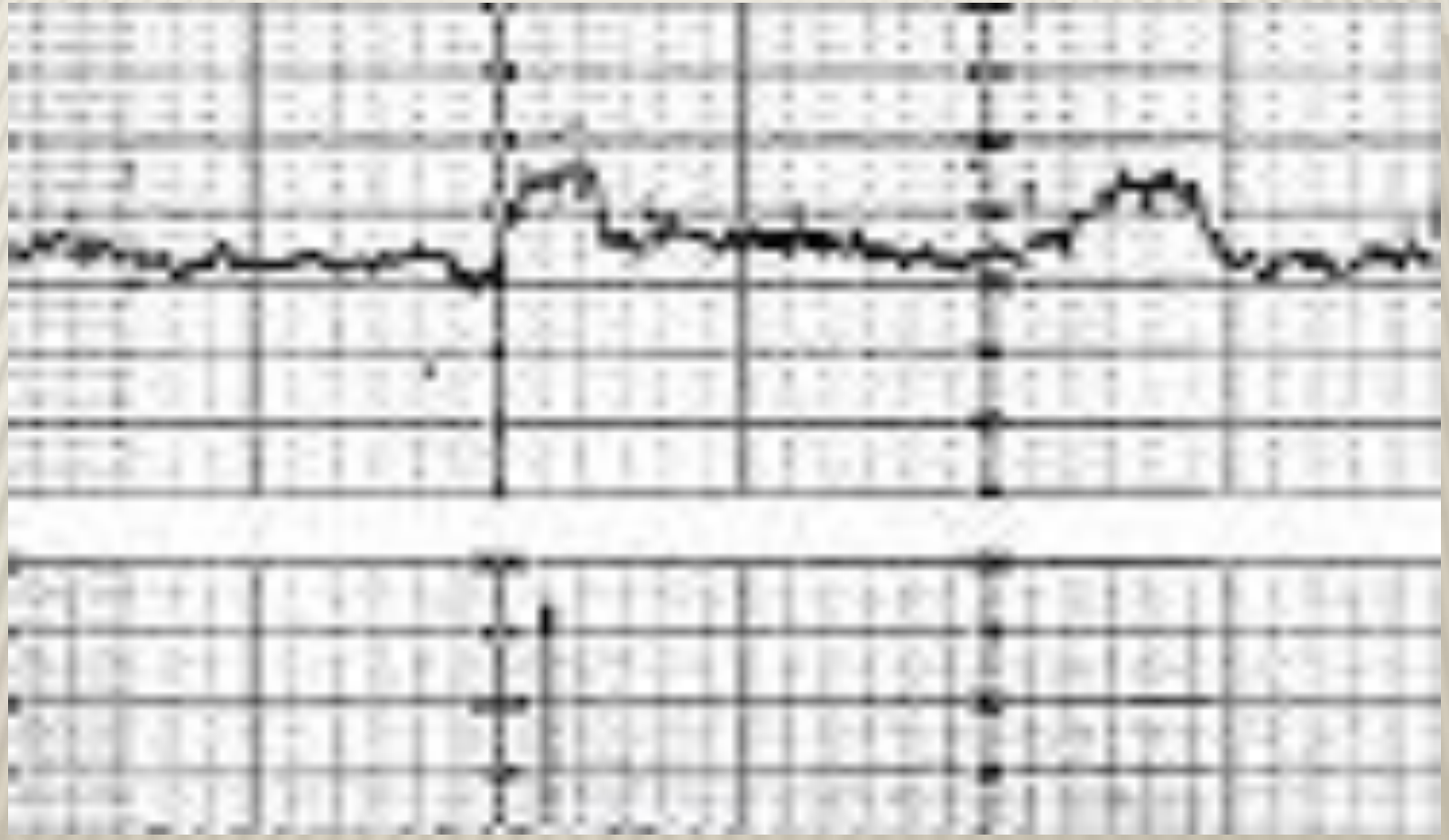
Non reactive:

No acceleration after 20 minutes- proceed for another 20 minutes

NON STRESS TEST (NST)

- 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%

NST

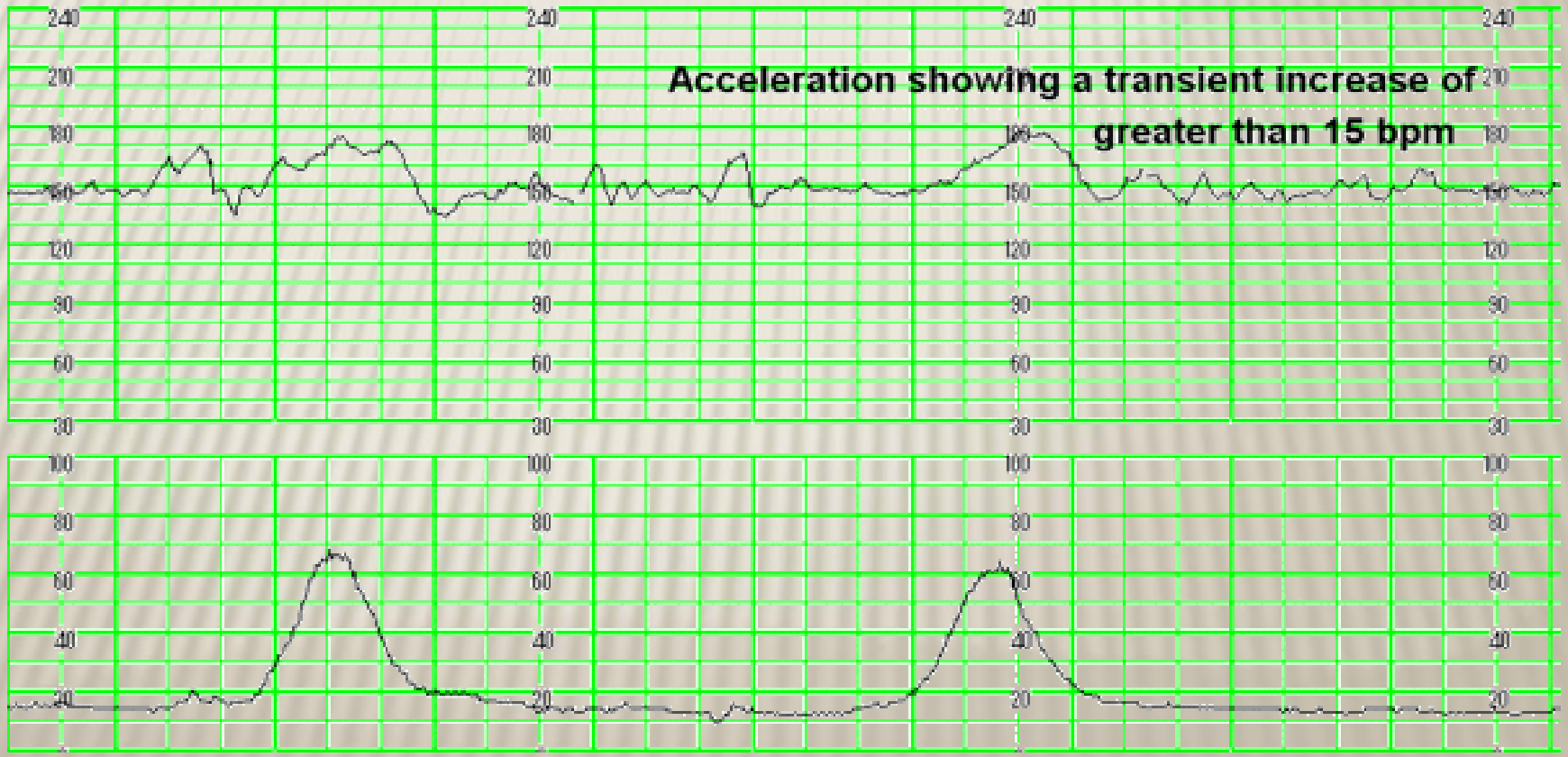


INTERPRETATION OF CTG

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



DECELERATION

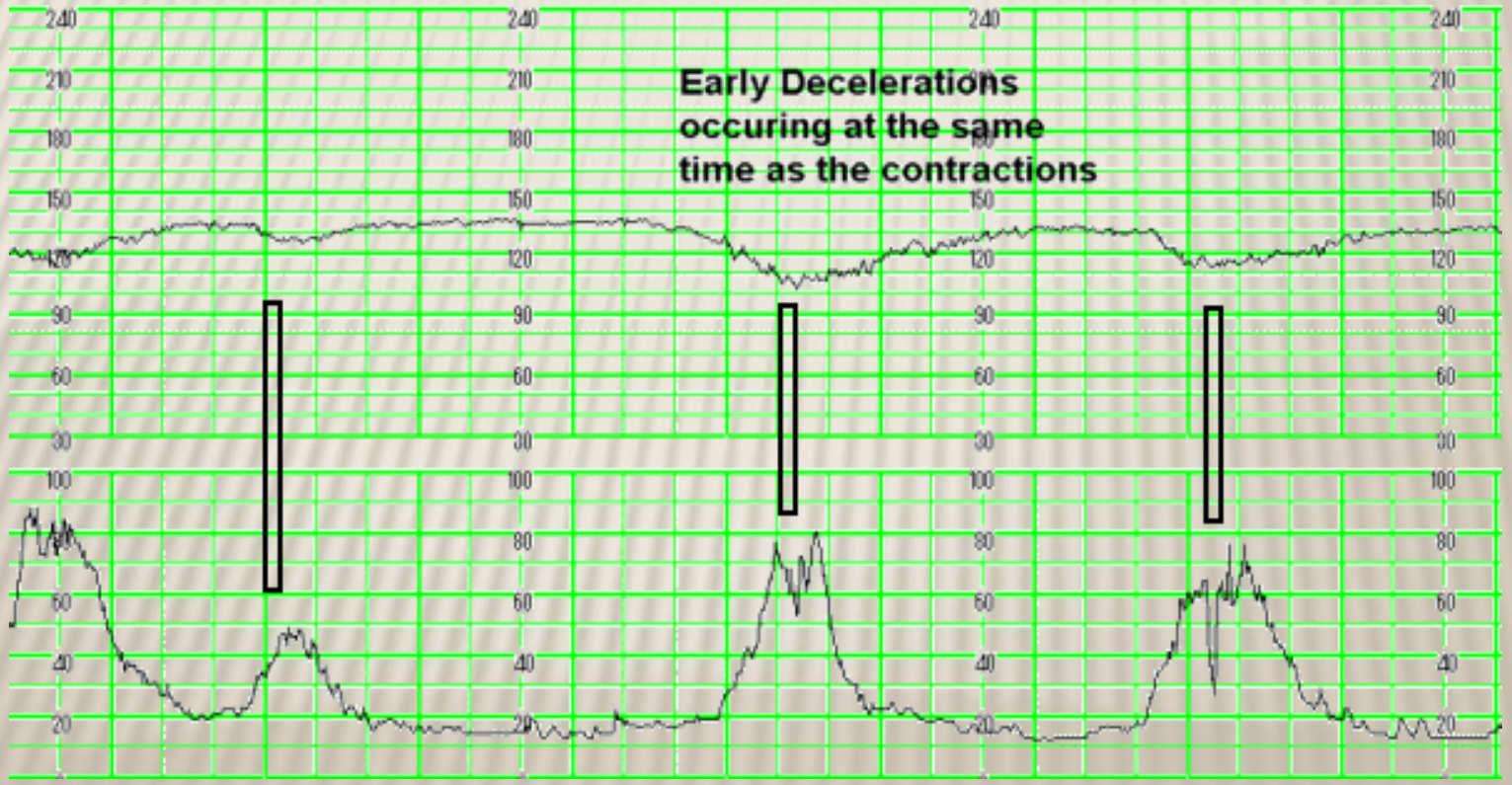
EARLY : Head compression

LATE : U-P Insufficiency

VARIABLE : Cord compression

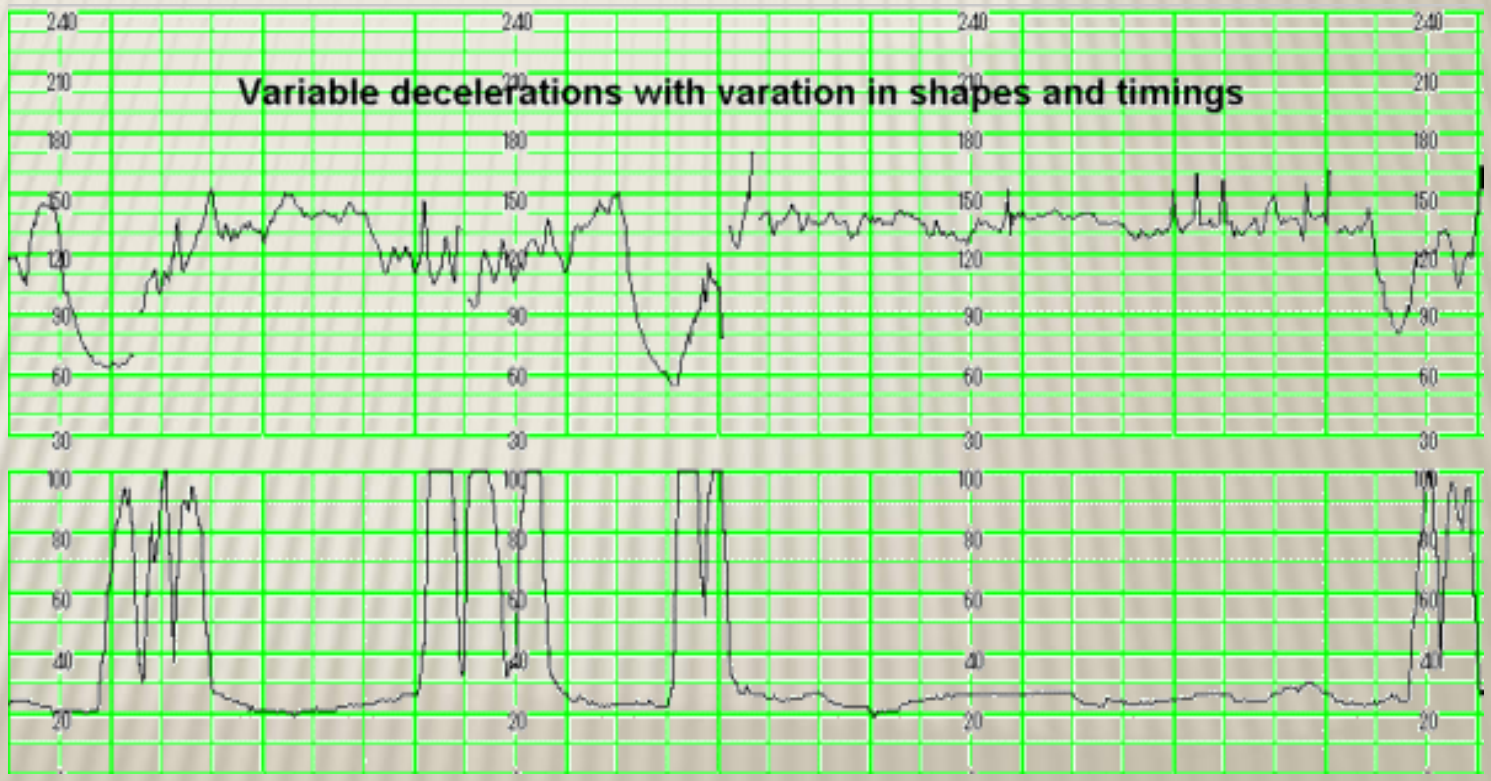
Primary CNS dysfunction

EARLY DECELERATION

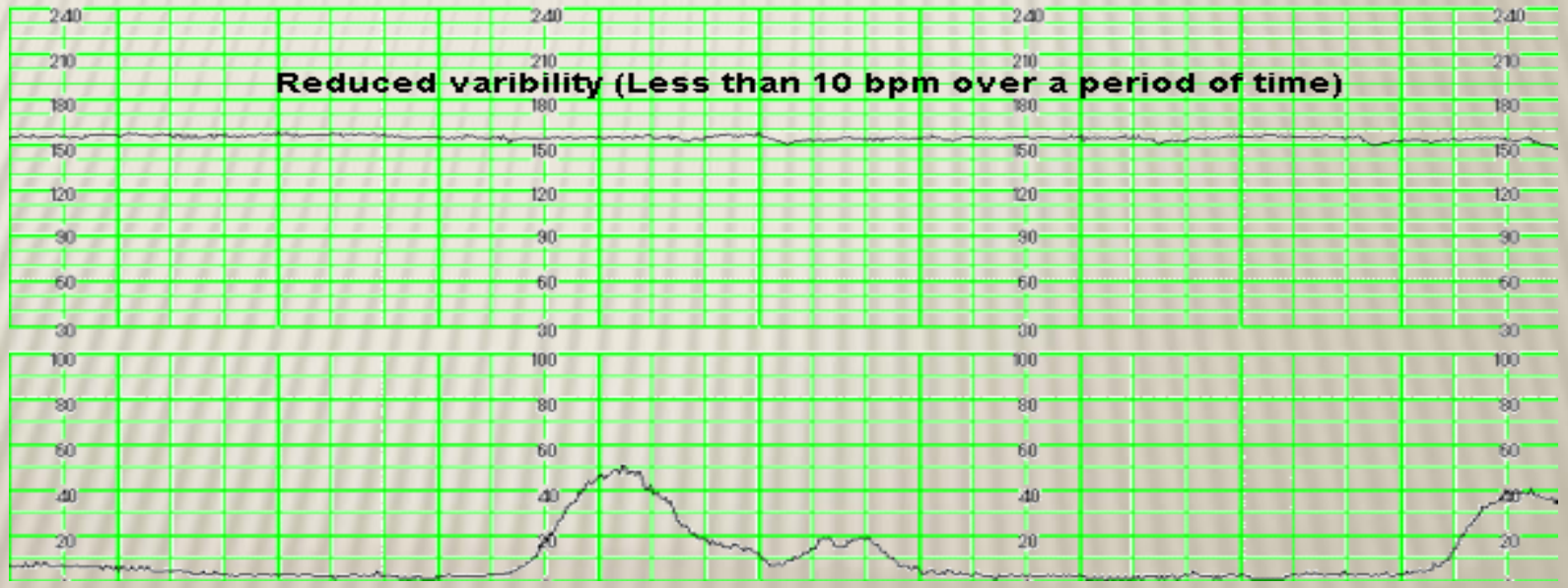


LATE DECELERATION

VARIABLE DECELERATION



REDUCED VARIABILITY



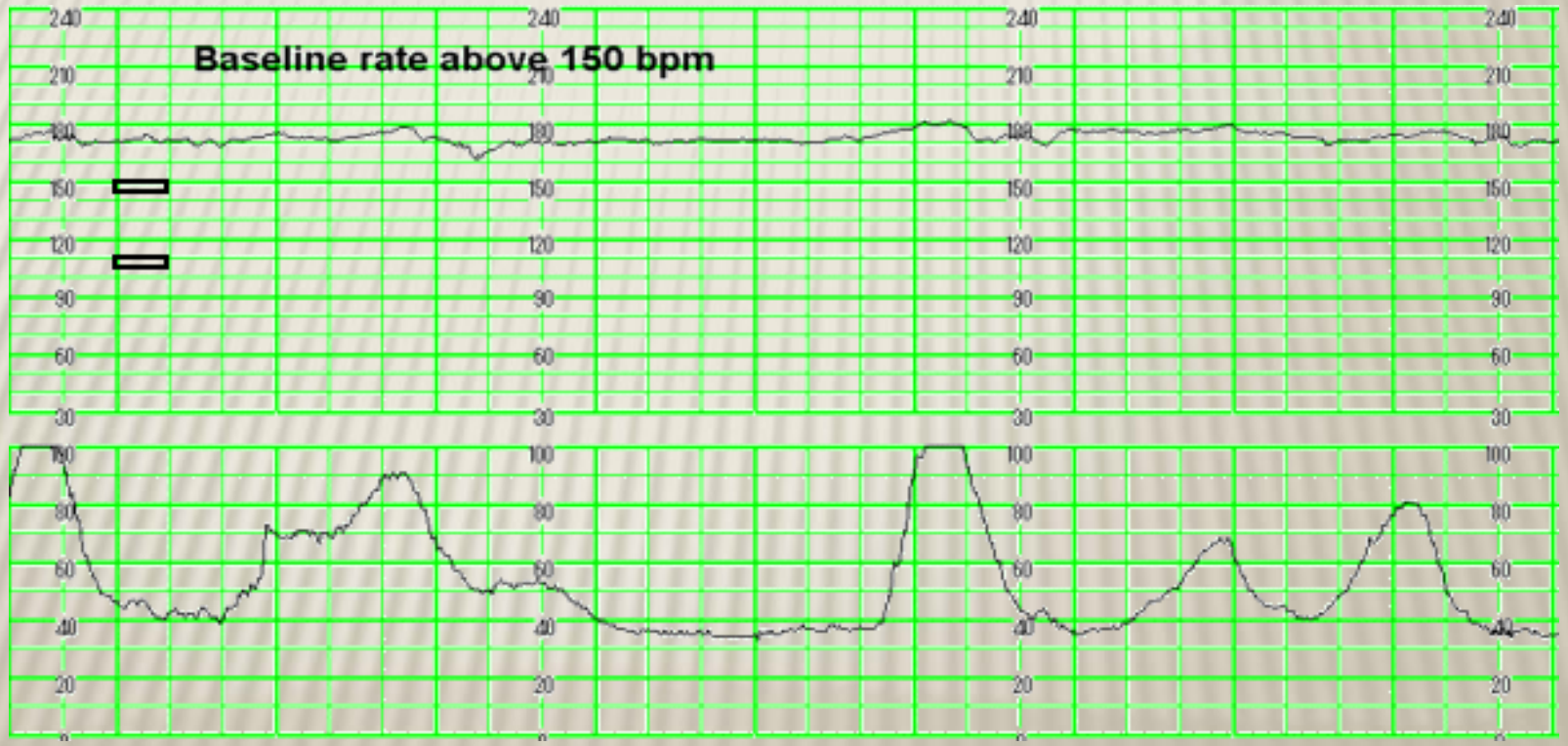
TACHYCARDIA

HYPOXIA

CHORIOAMNIONITIS

MATERNAL FEVER B-MIMETIC DRUGS

FETAL ANAEMIA,SEPSIS,HT FAILURE,ARRHYTHMIAS



AMNIOTIC FLUID VOLUME ~AFI

- Amniotic fluid index AFI

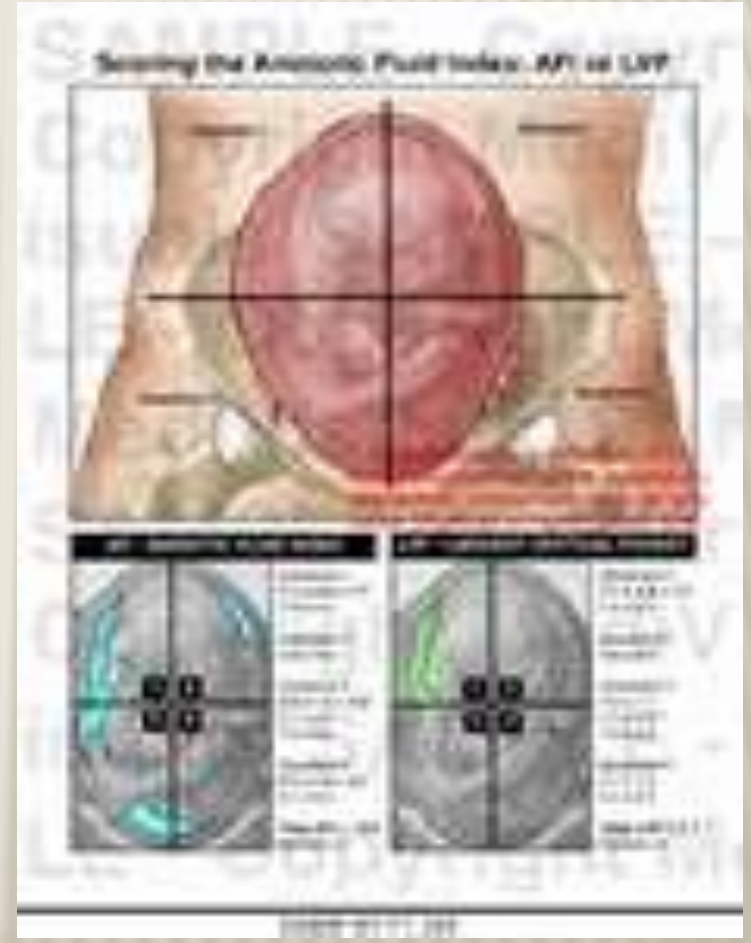
-the sum of the maximum vertical fluid pocket diameter in four quarters

-the normal value 5-25cm

-<5~ oligohydraminous

->24cm polyhydraminous

AMNIOTIC FLUID VOLUME



BIOPHYSICAL PROFILE (BPP)

- Combines NST with USS estimation AFV, fetal breathing, body movement & reflex/tone/extension-flexion movement .
- it is a scoring system
- it is done over 30minute
- It measure acute hypoxia(NST, body mov. &breathing) & chronic hypoxia (AFI)

FETAL BIOPHYSICAL PROFILE/NST+

Biophysical Variable	Normal (score=2)	Abnormal (score= 0)
Fetal breathing movements	1 episode FBM of at least 30 s duration in 30 min	Absent FBM or no episode >30 s in 30 min
Fetal movements	3 discrete body/limb movements in 30 min	2 or fewer body/limb movements in 30 min
Fetal tone	1 episode of active extension with return to flexion of fetal limb(s) or trunk. Opening and closing of the hand considered normal tone	Either slow extension with return to partial flexion or movement of limb in full extension Absent fetal movement
Amniotic fluid volume	1 pocket of AF that measures at least 2 cm in 2 perpendicular planes	Either no AF pockets or a pocket<2 cm in 2 perpendicular planes

BPP

- The risk of fetal death within 1 week if BPP is normal~ 1/1300
- Modified BPP (mBPP)

-NST & AFI

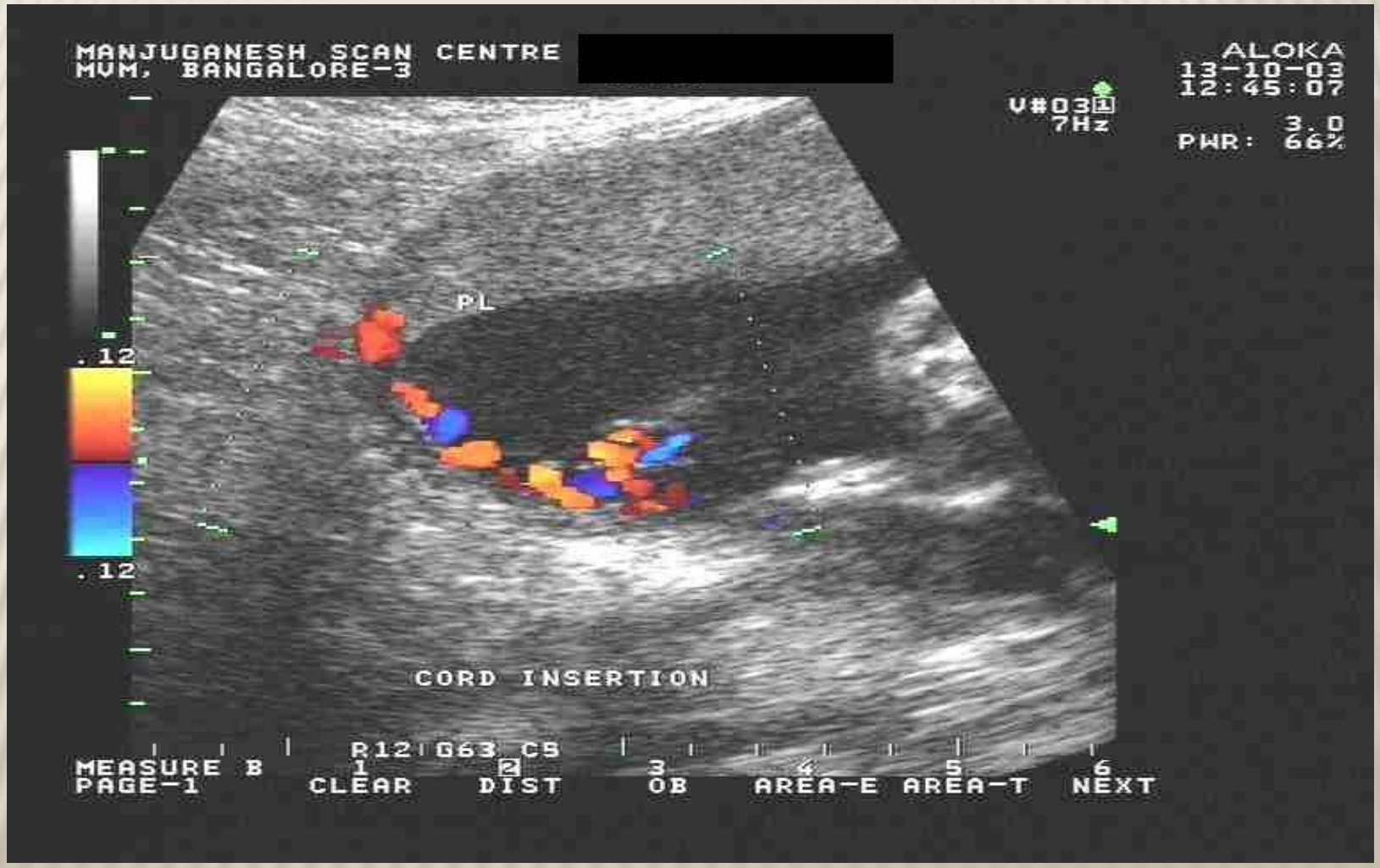
-low false negative 0.8/1000

-high false positives ~60%

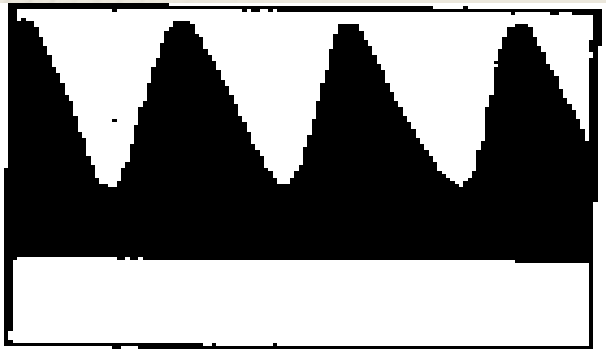
DOPPLER VELOCIMETRY

- 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

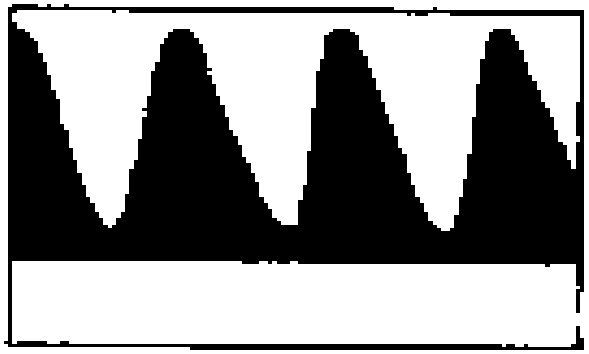
UMBILICAL ARTERY WAVEFORM



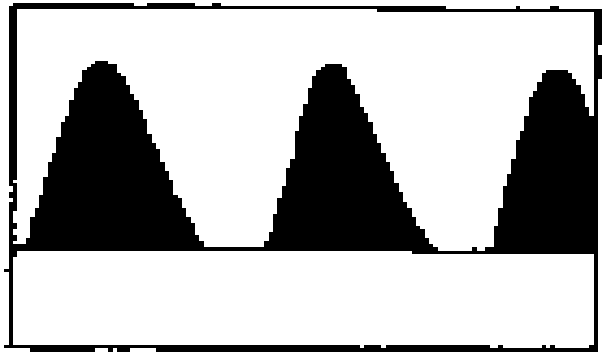
UMBILICAL ARTERY DOPPLER



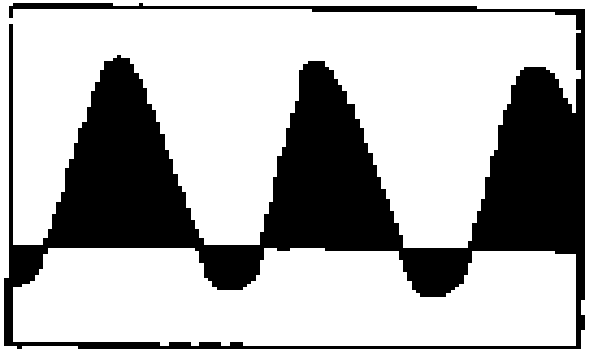
Normal pregnancy



Reduced end diastolic velocity



Absent end diastolic velocity



Reversed end diastolic velocity


Umbilical Cord Doppler

Antenatal testing methodologies

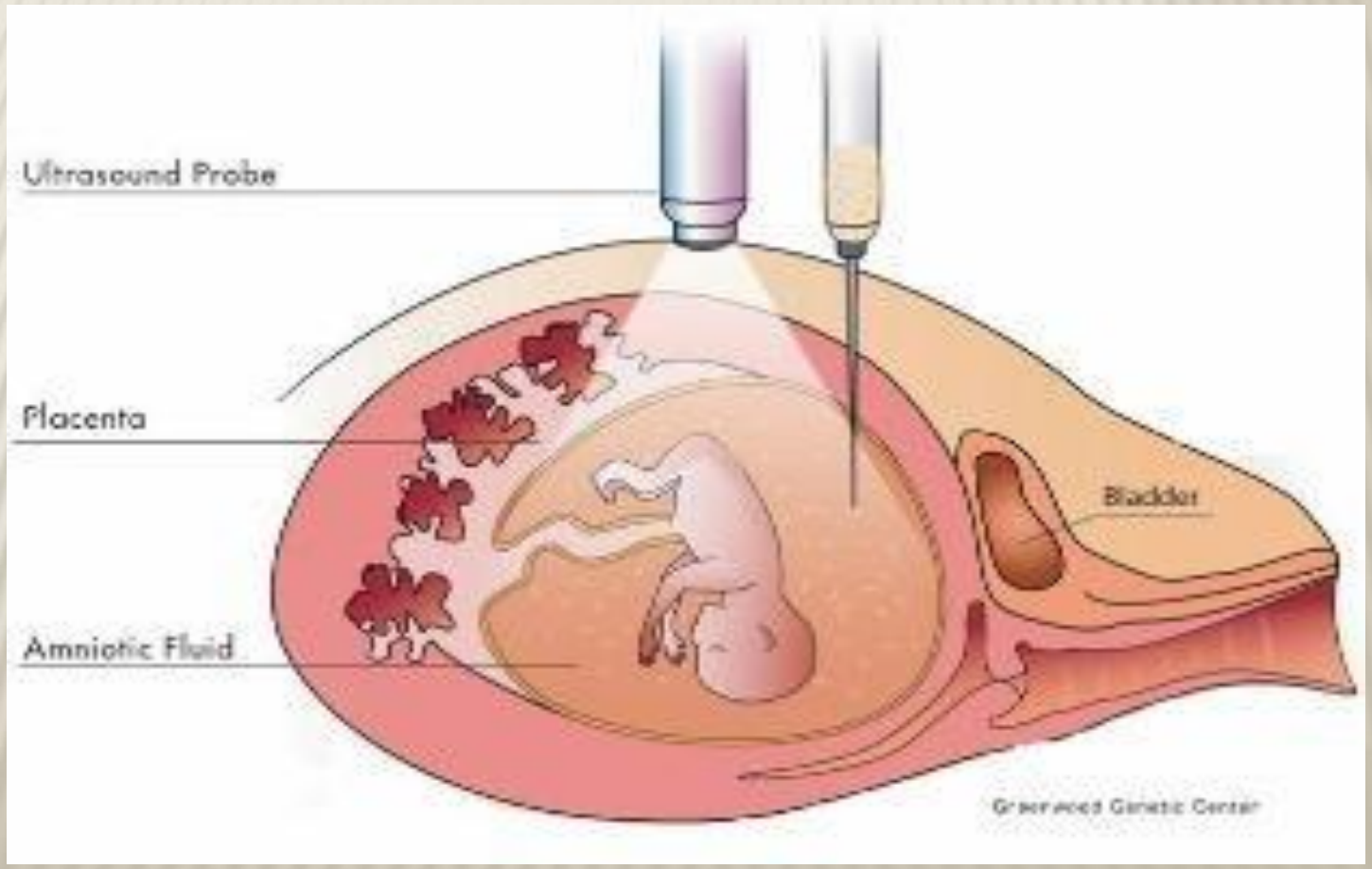
Name	Components	Results/scoring	False negative	False positive	References
Contraction stress test (oxytocin challenge test)	Continuous FHR monitoring At least 3 contractions of ≥40s duration within 10 min	**Negative:** no late or significant variable decelerations **Positive:** late decelerations following ≥50 percent of contractions, even if there are <3 contractions in 10 min **Equivocal - suspicious:** intermittent late decelerations or significant variable decelerations **Equivocal - hyperstimulatory:** decelerations with contractions occurring more frequently than q 2 min. or lasting >90s **Unsatisfactory:** <3 contractions in 10 min. or uninterpretable FHR tracing	0.04 percent	35-65 percent	[1,2]
Nonstress Test	Continuous FHR monitoring FHR accelerations: ≥32w: reaching 15 bpm above baseline and lasting ≥15s	**Reactive:** ≥2 accelerations within 20 min (may be extended to 40 min) **Nonreactive:** <2 accelerations in 40 min	0.2-0.65 percent	55-90 percent	[3-8]
Biophysical profile	Presence or absence of 5 components within 30 min: • Reactive NST • ≥1 episode of fetal breathing movements lasting ≥30s • ≥3 discrete body or limb movements • ≥1 episode of extremity extension with return to flexion or opening or closing of a hand • Maximum vertical AF pocket >2 cm or AFI >5 cm	Each component present is assigned score of 2 points; maximum score is 10/10 • **Normal:** ≥8/10 or 8/8 excluding NST • **Equivocal:** 6/10 • **Abnormal:** ≤4/10	0.07-0.08 percent	40-50 percent	[9-11]
Modified biophysical profile	NST AFI	**Normal:** Reactive NST *and* AFI >5 cm **Abnormal:** Nonreactive NST *and/or* AFI ≤5 cm	0.08 percent	60 percent	[12-15]

s=seconds; NST=nonstress test; AFI=amniotic fluid index; FHR=fetal heart rate; w=weeks

1. Freeman, RK, Anderson, G, Dorchester, W. A prospective multi-institutional study of antepartum fetal heart rate monitoring. II. Contraction stress test versus nonstress test for primary surveillance. Am J Obstet Gynecol 1982; 143:778.
2. Lagrew, DC Jr. The contraction stress test. Clin Obstet Gynecol 1995; 38:11.
3. Platt, LD, Walla, CA, Paul, RH, Trujillo, ME, Loesser, CV, Jacobs, ND, et al. A prospective trial of the fetal biophysical profile versus the nonstress test in the management of high-risk pregnancies. Am J Obstet Gynecol 1985; 153:624.
4. Lavery, JP. Nonstress fetal heart rate testing. Clin Obstet Gynecol 1982; 25:689.

INVASIVE FETAL ASSESSMENT

- Amniocentesis



AMNIOCENTESIS

- Obtaining a sample of amniotic flui during pregnancy.
- Usullay done after 15w (can be done after 11w)
- Indication

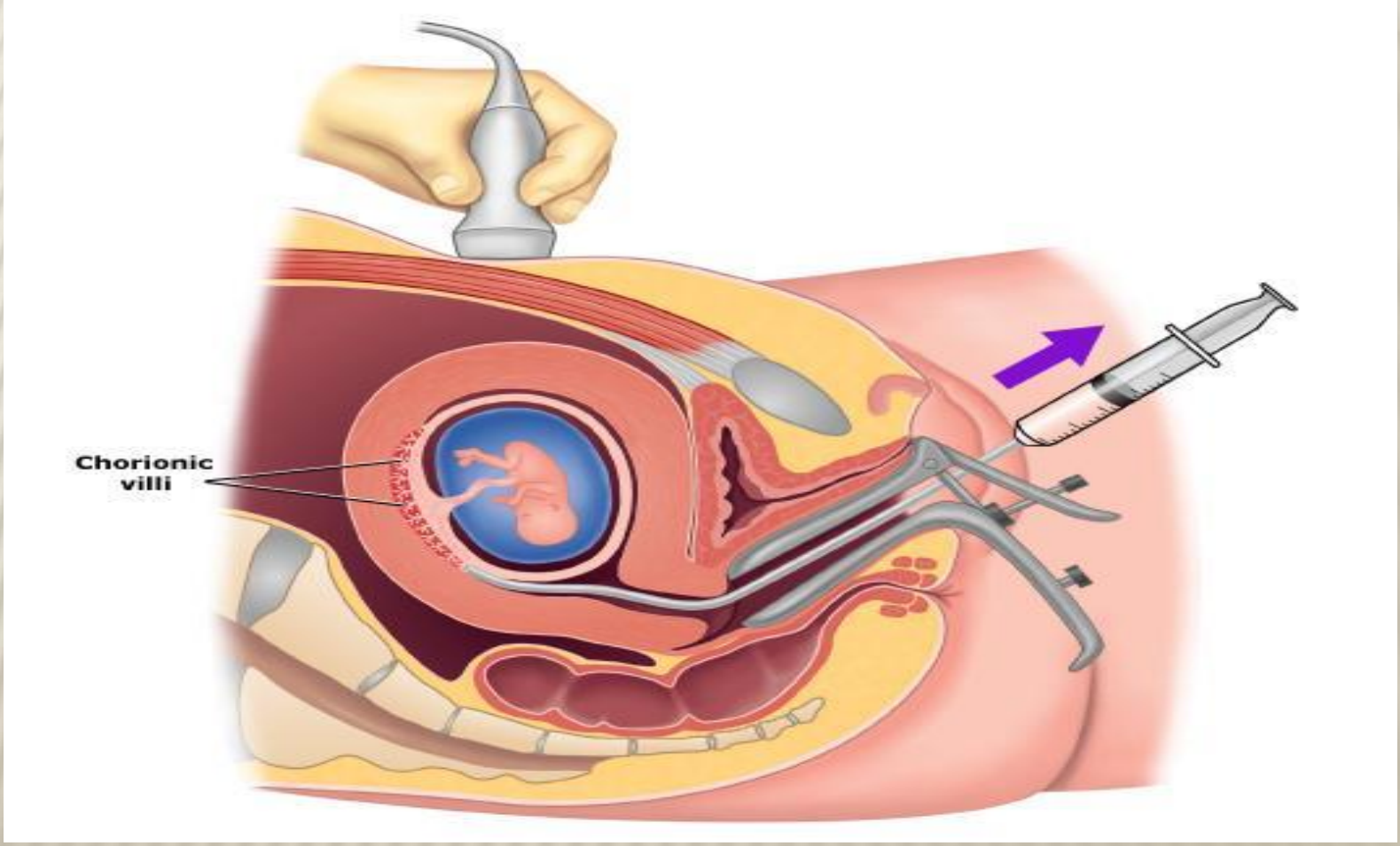
  -genitic (karyotype)

  -billirubin level (RH-isimunisation)

  -fetal lung maturity (L/S)

  -therputic in polyhydramnios
- *Risks: ROM ~1%, abortion 0.5%, infection 1/1000*

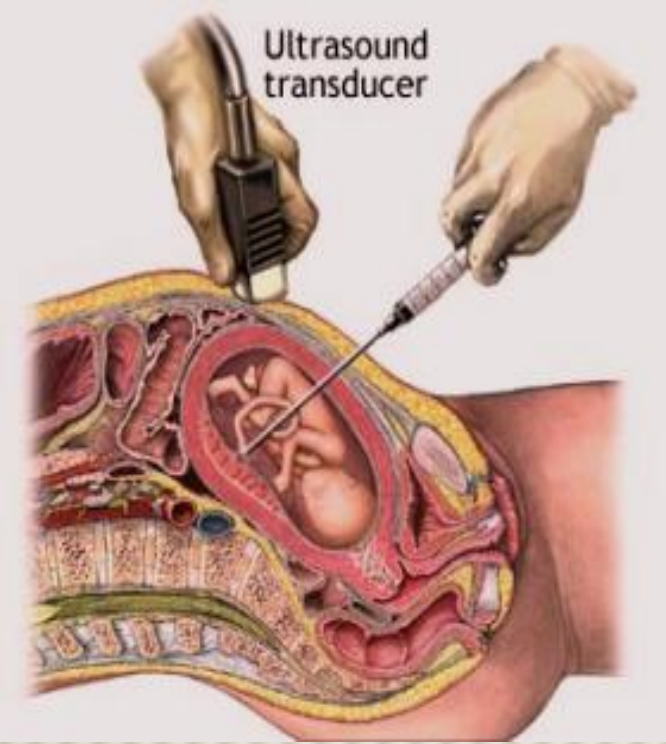
CVS chorionic villus sampling



CVS CHORIONIC VILLUS SAMPLING

- 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



CORDOCENTESIS

- Indication: - rapid karyotyping
  -diagnosis of inherited disorders
  -fetal HB assessment
  -fetal plt level
  -fetal blood transfusion

- Complication: bleeding, bradycardia, infection....

FETAL LUNG MATURITY

- 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

-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

FETAL LUNG MATURITY FLM

- All tests require amniocentesis for obtaining amniotic fluid

Comparison of FLM Laboratory Testing Options

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

THANK YOU