Fetal Assessment
Screening for high risk pregnancy

History

* Age •
* Social burden •
* Smoking •
* Past medical conditions e.g D.M, HTN •
* Past Obstetric history •
Fetal assessment

**Aim**: Ensure fetal wellbeing (Identify patients at risk of fetal asphyxia)

To prevent prenatal mortality & morbidity
When to start fetal Assessment

** 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
FETAL AND NEONATAL COMPLICATIONS OF ANTEPARTUM ASPHYXIA

Fetal Outcomes Neonatal Outcomes

Stillbirth Mortality
Metabolic acidosis at birth Metabolic acidosis
Hypoxic renal damage
Necrotizing enterocolitis
Intracranial haemorrhage
Seizures
Cerebral palsy
CONDITIONS ASSOCIATED WITH INCREASED PERINATAL MORBIDITY/MORTALITY WHERE ANTENATAL FETAL TESTING MAY HAVE AN IMPACT

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
Fetal Assessment

Fetal movement counting
Non stress test

Contraction stress test

Ultrasound fetal assessment

Umbilical Doppler Velocimetry
Fetal movement counting

Cardiff technique:
* Done in the morning, patient should
* calculate how long it takes to have 10 fetal movement
**10 movements should be appreciated in 12 hours
Fetal movement counting

Sadovsky technique:

- For one hour after meal the woman should lie down and concentrate on fetal movement
- 4 movement should be felt in one hour
- If not, she should count for another hour
- If after 2 hours four movements are not felt, she should have fetal monitoring
Non stress test

*Done using the cardiotocometry with the patient in left lateral position

**Record for 20 minutes
Cardiotocography (CTG) is recording the *fetal heartbeat* and the *uterine contractions* during *pregnancy*, typically in the third trimester.

The machine used for monitoring is called a cardiotocograph, more commonly known as an electronic fetal monitor or external fetal monitor (EFM).

CTG can be used to identify signs of *fetal distress*. 
Simultaneous recordings are performed by two separate transducers, one for the measurement of the fetal heart rate and a second one for the uterine contractions.

Each of the transducers may be either external or internal.
Internal measurement requires a certain degree of **cervical** dilatation, as it involves inserting a pressure catheter into the uterine cavity, as well as attaching a *scalp electrode* to the child's head to adequately measure the pulse.

Internal measurement is more precise, and might be preferable when a complicated childbirth is expected.
Cardiotocography is used to monitor several different measures:

1. Uterine contractions and

2. Four fetal heart rate features –
   - baseline heart rate,
   - variability,
   - accelerations, and
   - decelerations.
UTERINE CONTRACTIONS

Time between contractions, they are quantified as the number of contractions present in a 10 min window and averaged over 30 min.

Normal are 5 or less contractions in 10 min; more than 5 contractions in 10 min represents tachysystole.
How do uterine contractions affect fetal heart rate?

Uterine contractions can affect fetal heart rate by increasing or decreasing that rate in association with any given contraction.

The three primary mechanisms by which uterine contractions can cause a decrease in fetal heart rate are compression of:

- Fetal head
- Umbilical cord
- Uterine myometrial vessels
Baseline Fetal Heart Rate. The baseline fetal heart rate is the heart rate range that occurs between contractions.

How Do You Determine Baseline Fetal Heart Rate?

Look at the fetal heart rate occurring between contractions. This is the baseline fetal heart rate. Remember, the normal baseline heart rate can be anywhere between 110 and 160 beats per minute.
Accelerations are defined as a transient increase in heart rate of greater than 15 bpm for at least 15 seconds (the 15x15 rule). Two accelerations in 20 minutes is considered a reactive trace. Accelerations are a reassuring sign as they show fetal responsiveness and the integrity of the mechanisms controlling the heart.
Non stress test

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 44%
Contraction stress test

Fetal response to induced stress of uterine contraction and relative placental insufficiency

Should not be used in patients at risk of preterm labor or placenta previa

Should be proceeded by NST
Contraction stress test

- Contraction is initiated by nipple stimulation or by oxytocin I.V.
- The objective is 3 contractions in 10 minutes
- If late deceleration occurs-----positive CST
DECELERATIONS - decreases in fetal heart rate from the baseline by at least 15 beats per minute, lasting for at least 15 seconds. They are normally minimal. There are three types of decelerations, depending on their relationship with uterine contraction:

EARLY - begin at start of uterine contraction and end with conclusion of contraction; a sign of increased vagal tone due to fetal head compression.

VARIABLE - occur at any time irrespective of uterine contractions; a sign of umbilical cord compression.

LATE - begin at the peak of a contraction and ends long after it, a sign of fetal hypoxia due to uterus or placental insufficiency - the most worrisome deceleration.
Rate Between 110 and 150 bpm

Good Baseline variation
Acceleration showing a transient increase of greater than 15 BPM
Early deceleration

Early Decelerations occurring at the same time as the contractions
Late deceleration
Variable Deceleration

Variable decelerations with varation in shapes and timings
Reduced Variability

Reduced variability (Less than 10 bpm over a period of time)
Tachycardia
Hypoxia
Chorioamnionitis
B-Mimetic drugs
Maternal fever
Fetal anaemia, sepsis, HT failure, arrhythmias

Baseline rate above 150 bpm
**CATEGORY I (NORMAL):** Tracings with all these findings present are strongly predictive of normal fetal acid-base status and the fetus can be followed in a standard manner:

- Baseline rate 110-160 bpm,
- Moderate variability,
- Absence of late, or variable decelerations,
- Early decelerations and accelerations may or may not be present.
CATEGORY II
(INDETERMINATE): Tracing is not predictive of abnormal fetal acid-base status, but evaluation and continued surveillance and reevaluations are indicated.
CATEGORY III (ABNORMAL): Either tracing predicts abnormal fetal acid-base status; this requires prompt evaluation and management:

- Absence of baseline variability with recurrent late or variable decelerations or bradycardia
Use of CTG during the third trimester to monitor fetal wellbeing is called a nonstress test.

A positive (good) result is indicated by a reactive non-stress test.

This means that the fetal heart rate increased (acceleration) by at least 15 beats per minute for at least 15 seconds at least twice during a 20 minute interval.
**Principle**: the basic concept is that a multiple variable assessment of fetal biophysical activities is more sensitive and reliable test for fetal well being than the examination of a single parameter.

The profile is made up of five components. Apart from the standard NST, the other parameters are observed using ultrasonography.
THE FEATURES OF A NORMAL SCORE ARE

• A reactive non stress test (NST)
• Presence of at least one **fetal breathing movement** within 30 minutes and lasting for 30 seconds or more.
• Presence of at least 3 discrete **gross fetal movements** within a 30 min period.
• Presence of **fetal tone** which is defined as one or more episodes of limb extension with return to flexion within a 30 min.
• Adequate **amniotic fluid volume** evidenced by one or more larger pockets of fluid greater than 1cm in vertical diameter.
Abdominal circumference
Growth chart

BPD

HC

AC

mm

weeks

mm

weeks

mm

weeks
Placental localization
Placenta previa
Amniotic fluid
# Fetal Biophysical profile

<table>
<thead>
<tr>
<th>Biophysical Variable</th>
<th>Normal (score=2)</th>
<th>Abnormal (score=0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal breathing movements</td>
<td>1 episode FBM of at least 30 s duration in 30 min</td>
<td>Absent FBM or no episode &gt;30 s in 30 min</td>
</tr>
<tr>
<td>Fetal movements</td>
<td>3 discrete body/limb movements in 30 min</td>
<td>2 or fewer body/limb movements in 30 min</td>
</tr>
<tr>
<td>Fetal tone</td>
<td>1 episode of active extension with return to flexion of fetal limb(s) or trunk. Opening and closing of the hand considered normal tone</td>
<td>Either slow extension with return to partial flexion or movement of limb in full extension Absent fetal movement</td>
</tr>
<tr>
<td>Amniotic fluid volume</td>
<td>1 pocket of AF that measures at least 2 cm in 2 perpendicular planes</td>
<td>Either no AF pockets or a pocket&lt;2 cm in 2 perpendicular planes</td>
</tr>
<tr>
<td>Test Score Result</td>
<td>Interpretation</td>
<td>Management</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10 of 10</td>
<td>Risk of fetal asphyxia extremely rare</td>
<td>Intervention for obstetric and maternal factors</td>
</tr>
<tr>
<td>8 of 10 (normal fluid)</td>
<td>Risk of fetal asphyxia extremely rare</td>
<td>Intervention for obstetric and maternal factors</td>
</tr>
<tr>
<td>8 of 8 (NST not done)</td>
<td>Risk of fetal asphyxia extremely rare</td>
<td>Intervention for obstetric and maternal factors</td>
</tr>
<tr>
<td>8 of 10 (abnormal fluid)</td>
<td>Probable chronic fetal compromise</td>
<td>Determine that there is functioning renal tissue and intact membranes. If so, delivery of the term fetus is indicated. If so, delivery of the term fetus is indicated. If so, delivery of the term fetus is indicated.</td>
</tr>
<tr>
<td>6 of 10 (normal fluid)</td>
<td>Equivocal test, possible fetal asphyxia</td>
<td>Repeat test within 24 hr</td>
</tr>
<tr>
<td>6 of 10 (abnormal fluid)</td>
<td>Probable fetal asphyxia</td>
<td>Delivery of the term fetus. In the preterm fetus less than 34 weeks, intensive surveillance may be preferred to maximize fetal maturity.</td>
</tr>
<tr>
<td>4 of 10</td>
<td>High probability of fetal asphyxia</td>
<td>Deliver for fetal indications</td>
</tr>
<tr>
<td>2 of 10</td>
<td>Fetal asphyxia almost certain</td>
<td>Deliver for fetal indications</td>
</tr>
<tr>
<td>0 of 10</td>
<td>Fetal asphyxia certain</td>
<td>Deliver for fetal indications</td>
</tr>
</tbody>
</table>
Umbilical Doppler Velocimetry

Indication:
IUGR
PET
D.M.
Any high risk pregnancy

Use a free loop of umbilical cord to measure blood flow in it
Umbilical cord
Umbilical Artery Doppler

- Normal pregnancy
- Reduced and diastolic velocity
-Absent and diastolic velocity
- Reversed and diastolic velocity
Resistance index = \( \frac{S-D}{S} \)  
S/D ratio = \( \frac{S}{D} \)  
Pulsatility index = \( \frac{S-D}{\text{mean}} \)
Umbilical cord doppler
Reverse flow in umbilical artery
Management of abnormal Doppler

Depends on:
- fetal maturity
- gestational age
- Obstetric history
Management of Doppler results

Reverse flow or absent end diastolic flow—— Immediate delivery

High resistance index—— repeat in few days or delivery

Normal flow—— repeat in 2 week if indicated
Thank you