ANTEPARTUM FETAL ASSESSMENT

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HIMSR

- Antepartum fetal surveillance is the assessment of fetal well being in utero before the onset of labor
- Early detection of fetus at risk so that timely management to prevent further deterioration
- Also find out normal fetuses and avoid unnecessary interventions
- Very high negative predictive value
- Very low positive predictive value

INDICATION OF FETAL SURVEILLANCE

- Maternal conditions

- Hypertension
- Diabetes mellitus
- Heart Disease
- Chronic renal disease
- Acute febrile illness

- Pneumonia /asthma
- Epilepsy
- Collagen vascular disease
- Sickle cell disease
- Antiphospholipid syndrome
- Drug Abuse

- FETAL CODITIONS
- Fetal Growth Restriction
- Rh isoimmunization
- Fetal cardiac arrythmias
- Hydrops fetalis
- Fetal infections

- **PREGNANCY RELATED CONDITIONS**

- Preeclampsia
- Multiple pregnancy
- Post term pregnancy
- Decreased fetal movements
- Abnormal placentation
- Placental abruption

- Oligohydramnios
- Polyhydramnios
- Unexplained stillbirth in a previous pregnancy
- Cholestasis of pregnancy
- PROM
- Poorly controlled Gestational Diabetes mellitus

The Various Methods of Antepartum Fetal Surveillance

1) Clinical assessment by uterine growth
2) Fetal movement count by the mother
3) Ultrasound for fetal growth
4) Non stress test and cardiotocography
5) Vibroacoustic stimulation test
6) Contraction stress test
7) Nipple stimulation test
8) Biophysical profile
9) Modified biophysical profile

10) Doppler studies
11) Fetal lung maturation studies
12) Placental grading

TIMING OF SURVEILLANCE

- Monitoring is recommended when estimated fetal maturity is sufficient to expect a reasonable chance of survival should intervention be necessary.
- Depends on neonatal care facilities

CLINICAL ASSESSMENT

- Uterine growth
- Fundal growth and symphysiofundal height
- Abdominal growth

FETAL MOVEMENT COUNT

- Cardiff 10 count
- Daily fetal movement count-post meal

NON STRESS TEST

- Fetal heart rate pattern represented on paper
- Fetal heart rate acceleration in relation to fetal movement is a sign of fetal health
- This reactivitivity denotes CNS activity
- Its absence depicts hypoxia,drugs,fetal sleep,congenital anomalies
- Observed for 20 minutes but extended to 40 min if there are no accelerations in 20 minutes

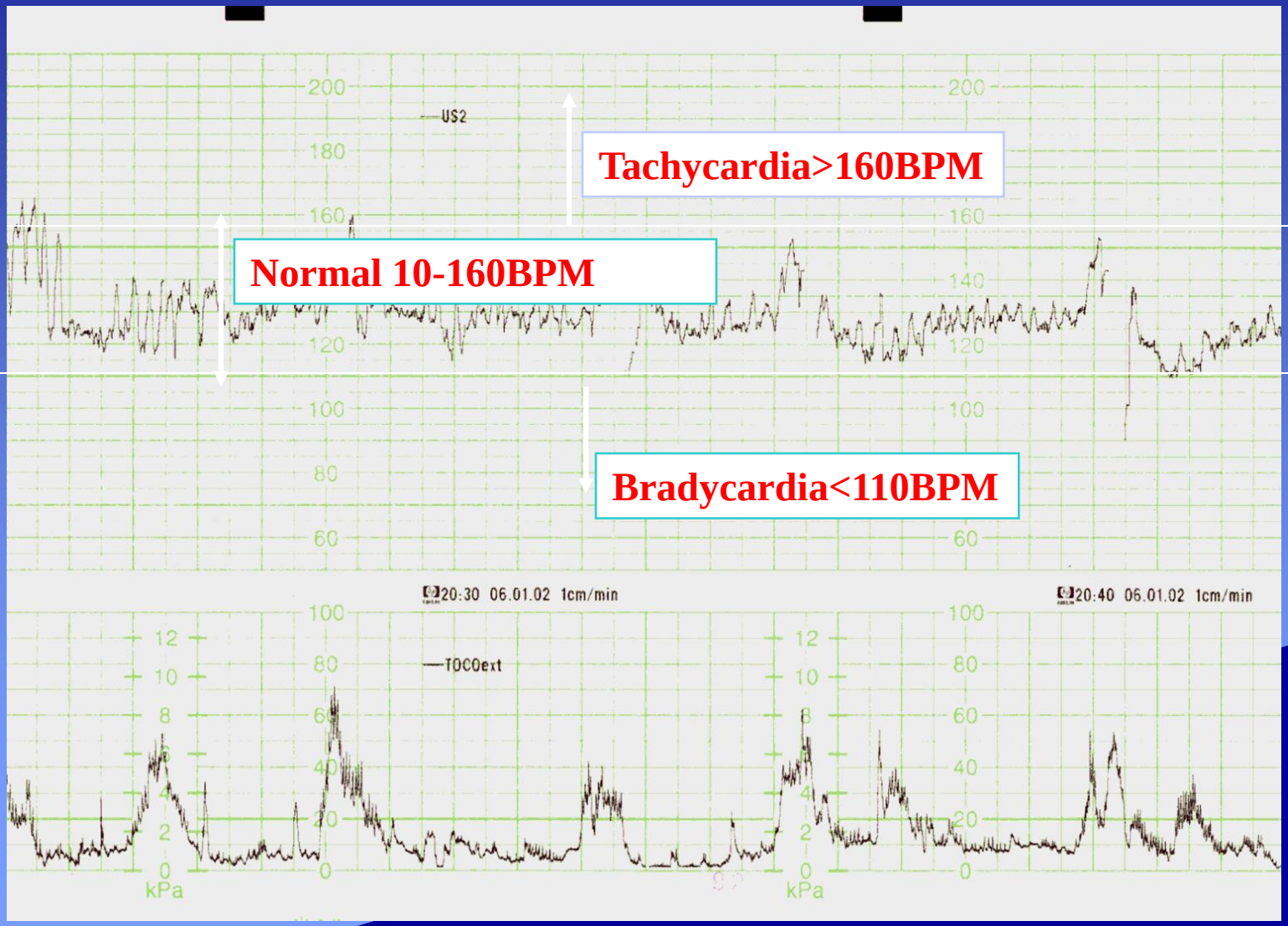
Variables studied

- Baseline fetal heart rate
- Variability
- Presence or absence of accelerations
- presence of decelerations

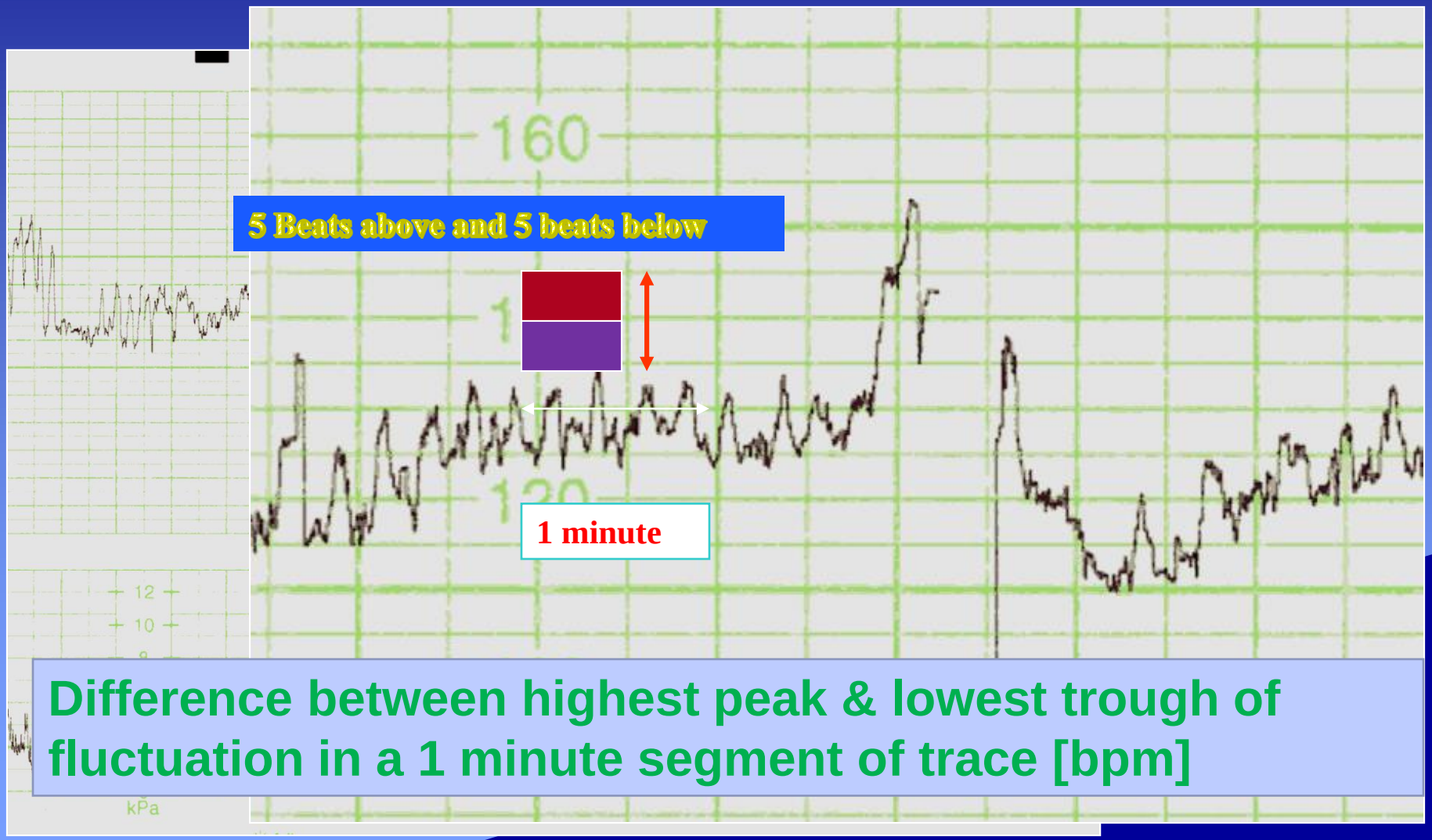
REACTIVE NST

- Baseline fetal heart rate between 110 to 160 bpm
- Baseline variability > 5 bpm
- Two or more accelerations of 15 bpm lasting 15 seconds in 20 minutes period
- No decelerations
- NST shd be done after 28 weeks as it is nonreative in 50% cases before that
- It is a screeing test with false positive rate of 50% and false negative rate of .3%

Baseline fetal heart rate



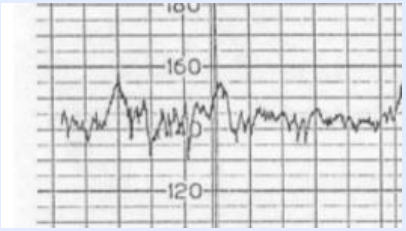
Baseline Variability



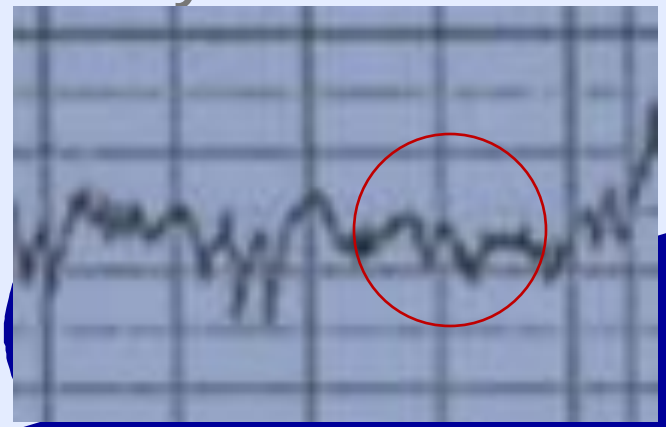
Difference between highest peak & lowest trough of fluctuation in a 1 minute segment of trace [bpm]

Baseline Variability

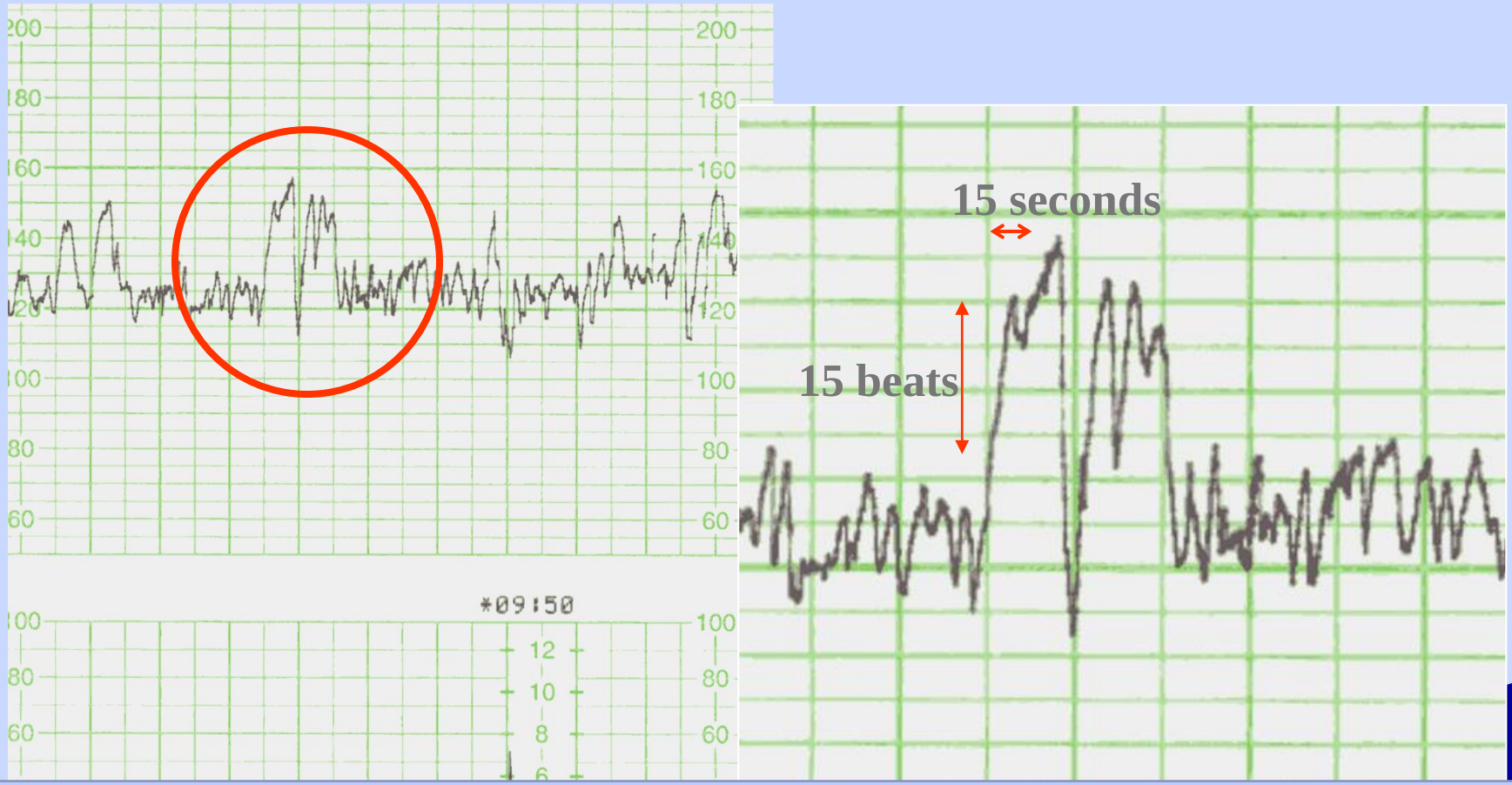
- Minor fluctuations in baseline FHR
- Wiggliness of the baseline
- Normal value : 5-25 bpm



- Reflects ANS activity
  - Ascending limb due to sympathetic activity
  - Descending limb due to parasympathetic activity



Acceleration



- Sudden rise of FHR from baseline by > 15 beats for > 15 s
- 2 accelerations in 15 minute : Reactive

Decelerations

Fall in baseline by >15 beats for > 15 s

Head compression
Cord compression
Oxytocin
Uteroplacental insufficiency
Abruption
Scar dehiscence

Early

5%

Variable

12.5%

Late

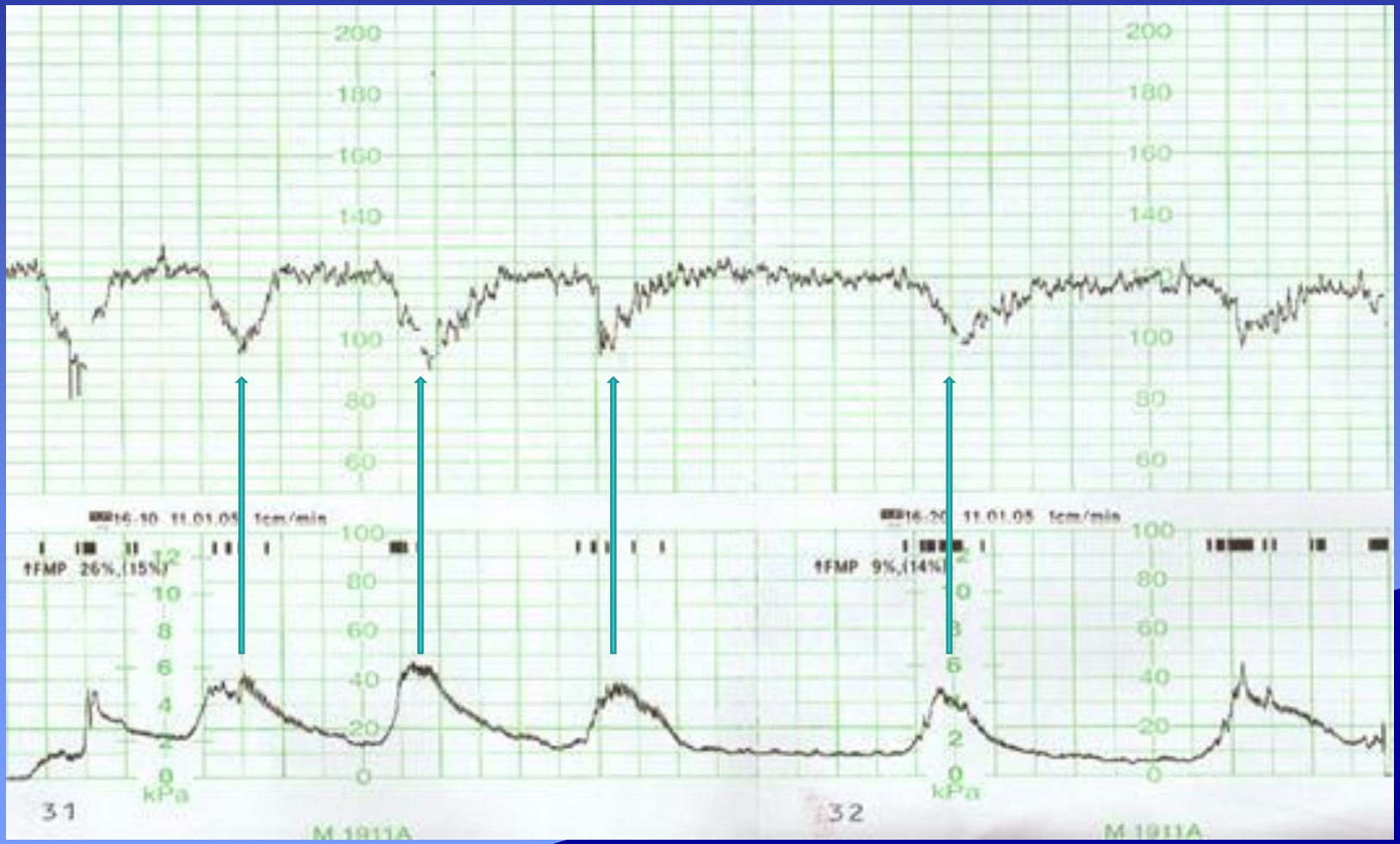
1-2%

Early decelerations

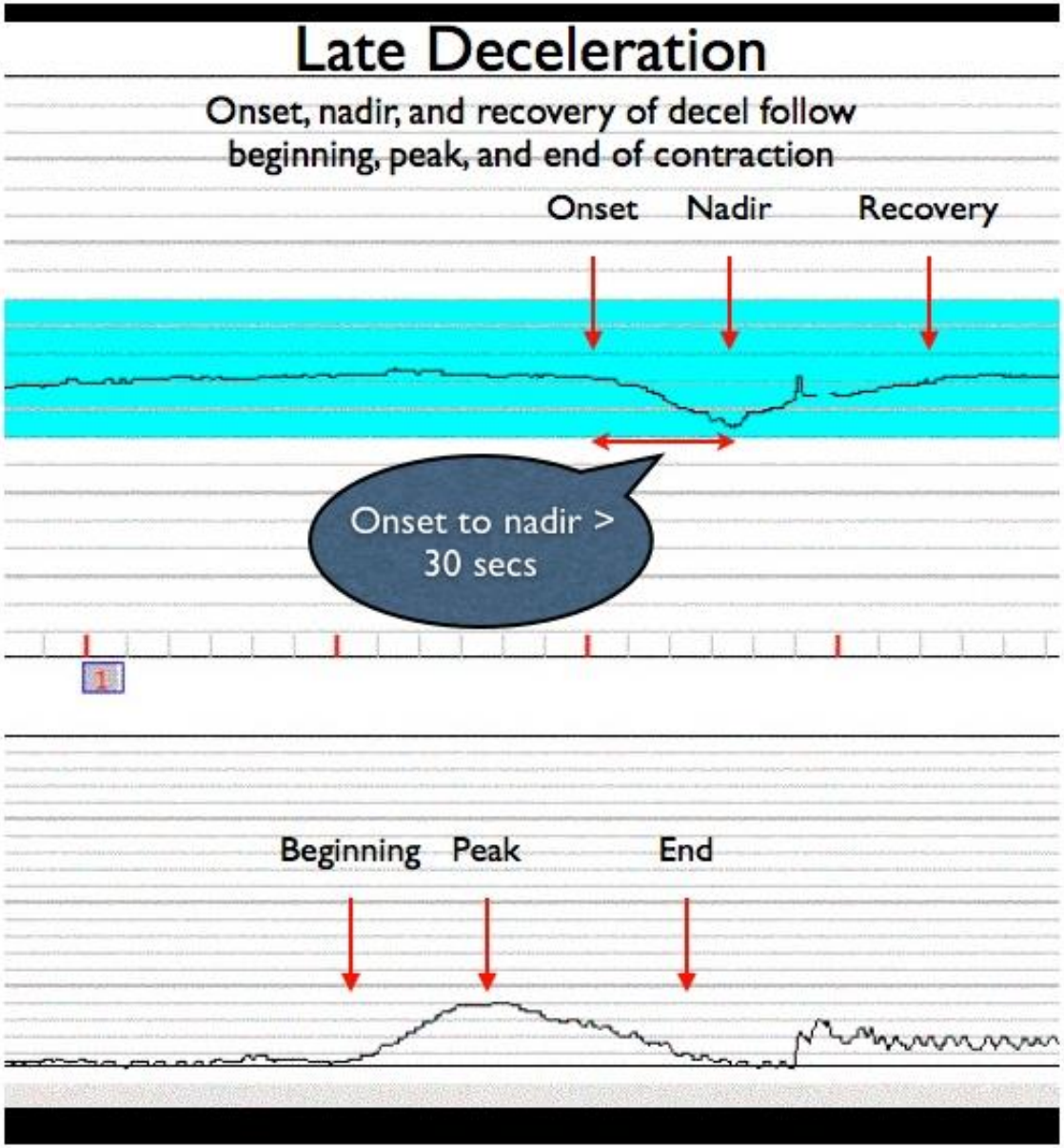
- ‘Uniform’ decelerations
- Cause: Vagal Stimulation due to head compression
- Seen in 2nd stage and LATE first stage of labour

Not due to hypoxia

Early decelerations



Late Deceleration



Late deceleration

- Starts towards the end or soon after acme of uterine contraction. [Lag of >20s before onset of contraction and deceleration]
- Rate does not recover until well after the contraction has ceased.

Pathogenesis

Impairment of blood flow and oxygen supply to intervillous space

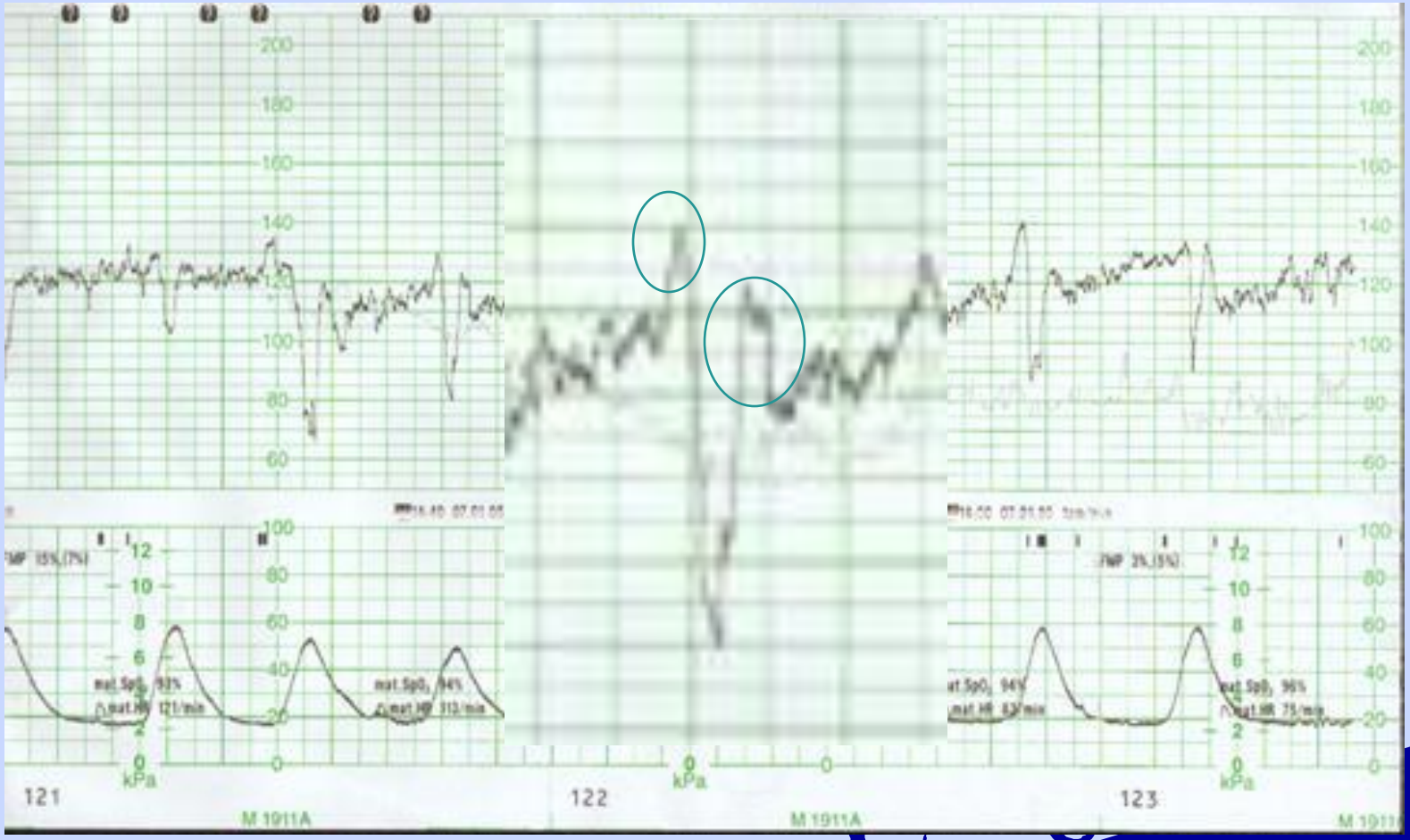
Chemoreceptor mediated


FHR 240 bpm
210
180
150
120
90
60
30
PSPD:1cm/min
PAT. ID:11100711
A
100
75
50
25
12
10
8
6
4
2
0 kPa
UA 0 mmHg
2526
MICRO MED CHARTS
11-10-07 06:59
07:05
07:11
07:17

Variable decelerations

Baroreceptor mediated

- ‘Non – uniform’ or ‘Variable’
- Vary in shape, size and timing in relation to contractions
- Cause: Cord compression, head compression
- **Most common type of deceleration**



Acceleration, before and after deceleration

Type of decel.	Fall in FHR	Cause	Onset	Onset to nadir	Recovery
Early	Gradual	Vagal mediated	With uterine contraction	>= 30 s	With end of contraction
Late	Gradual	Chemo-receptor	With acme of uterine contraction	>= 30 s	After end of contraction
Variable	Sudden	Baro-receptor		< 30 s	Total duration < 2mts

VIBROACOUSTIC STIMULATION TEST

- Done by artificial larynx 80-100db
- It reduces the testing time and false positive by 2%

CONTRACTION STRESS TEST

- To see the fetal response to uterine contractions
- Fetal oxygenation is transiently worsened by uterine contraction

CONTRACTION STRESS TEST

- Indication is nonreactive non stress test
- Contraindications
- Patient with risk of preterm labour
- PROM
- H/O uterine surgery,classical caesarean section
- Known placenta previa,multiple gestation,cervical incompetence,vasa previa

- Oxytocin infusion is given till there are 3 contractions in 10minutes
- Rarely done now days
- Negative-no late or variable decelerations
- Positive-late deceleration in > 50% of the contractions
- Nipple stimulation test is the same as oxytocin stress test
- Interpretation is same

BIOPHYSICAL PROFILE

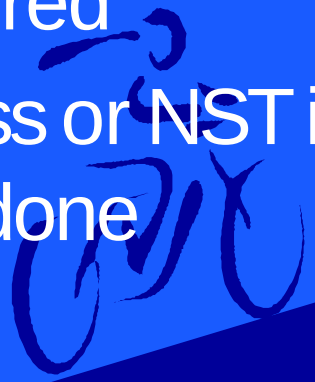
	SCORE 2	SCORE 0
1 non stress test	2 or more accelerations of 15 bpm lasting 15 sec in 20-40 min	nil or one acceleration
2 fetal breathing movement	One or more episode of sustained breathing movement for 30 sec	Less than 30 sec of breathing movement
3 fetal movement	3 or more discrete body or limb movement within 30 minutes	Less than 3 discrete movement in 30 minutes
4 fetal tone	One or more episode of limb extension or opening or closing of a hand within 30 minutes	No movement or no extension or flexion in 30 minutes
5 amniotic fluid volume	Single vertical pocket of more than 2 cm	Largest vertical pocket of 2 cm or less

Management of BPP

	Interpretation
If score is10	Fetus is normal repeat weekly.in DM and post term biweekly
If score is8	Oligohydramnios is an indication of delivery otherwise repeat weekly
If score is 6	Suspect asphysia,if > 36 weeks deliver
If score is4	Deliver
If score is2	Deliver

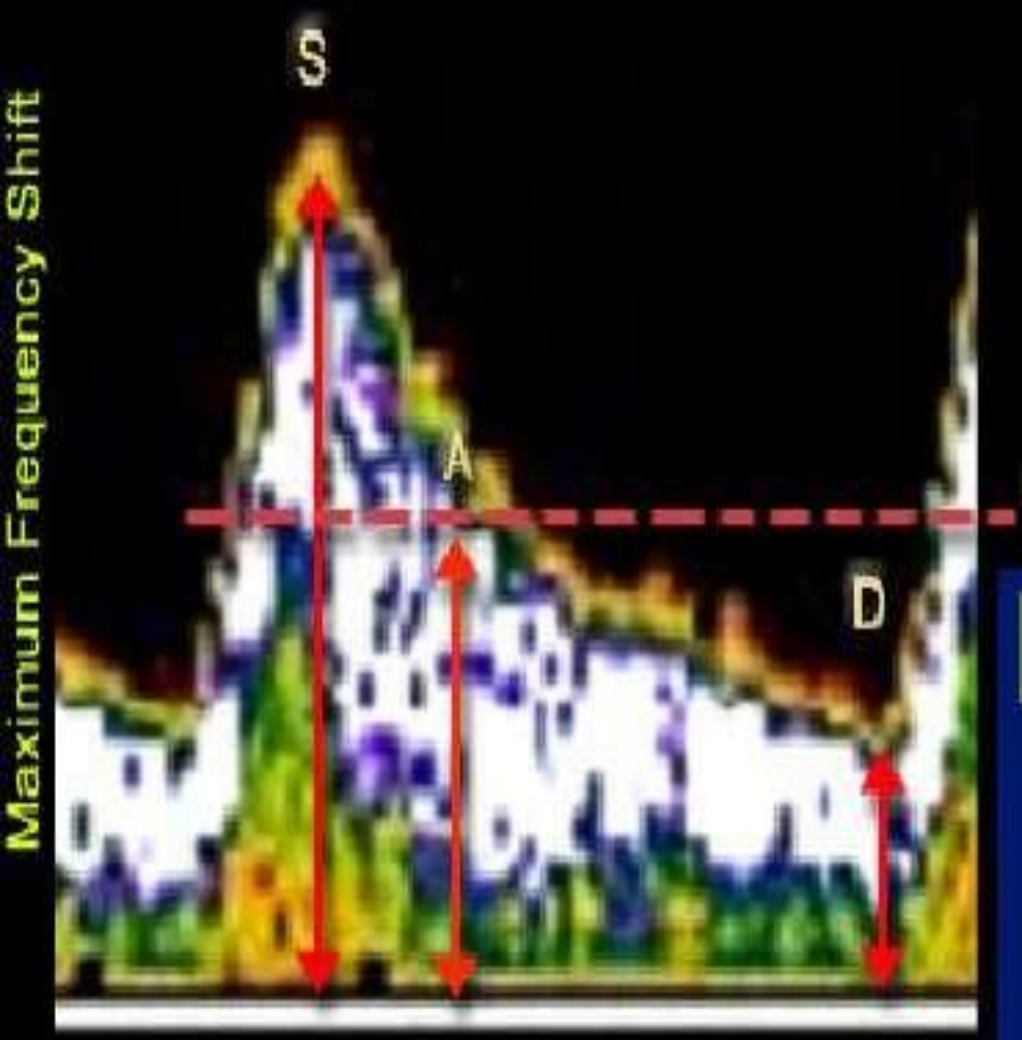
MODIFIED BIOPHYSICAL PROFILE

- Combines NST and Amniotic fluid index
- Takes only 10 minutes to perform
- It is reactive if the NST is reactive and AFI is more than 5.it is then repeated once a week or earler if clinicaly required
- It is abnormal if AFI is less or NST is non reactive. Then a BPP is done



DOPPLER STUDIES

- Uterine arteries to predict placental insufficiency later on
- Umblical arteries in fetal growth restriction,preeclampdia ,DM,reduced fetal movement ….
- MCA in fetal growth restriction and rh isoimmunisation
- Ductus venosus and umblical veins for fetal growth restriction



S = systolic peak (max. velocity)
D = end diastolic flow
Vm = mean velocity
A = Temporal average frequency over 1 cardiac cycle

Doppler Indices

RI = (S - D) / S (Pourcelot, 1974)

PI = (S - D) / A (Gosling, 1976)

S/D Ratio = S/D (Stuart & Drumm, 1980)

Changes in the Arterial Circulation

Uterine arteries Doppler

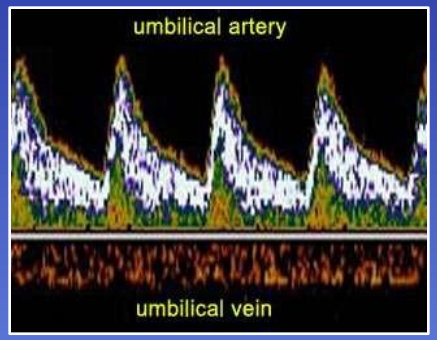
- The changes in vascular resistance is more marked in uterine artery closer to placental implantation site.

- Diastolic notching is an index of increased impedance to flow.

Abnormal uterine arteries waveforms in first trimester is associted with development of preeclampsia, abruption, FGR, morbidity & mortality.

Changes in the Arterial Circulation

Umbilical artery – Signature Vessel

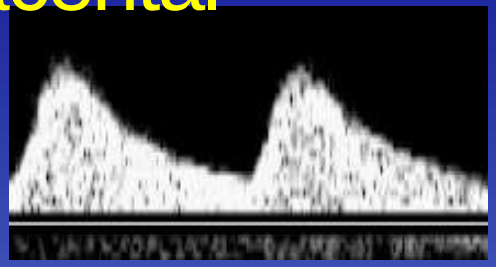


A direct reflection of the flow within the placenta

First vessel to be studied when suspecting IUGR

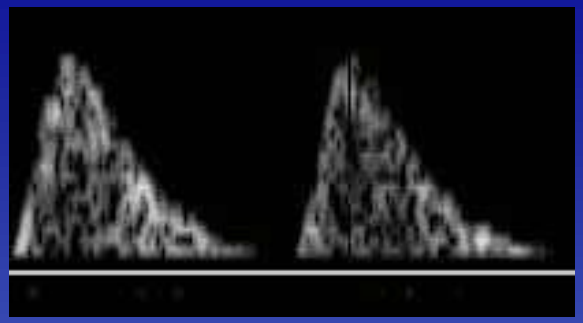
characteristic saw-tooth appearance of arterial flow in one direction and continuous umbilical venous blood flow in the other.

The sequence of events of progressive fetal compromise secondary to placental insufficiency:



- Increased UA S/D resistance without centralization of flow.
- Means UA S/D above normal and MCA S/D normal
- less worrisome Indicates need for closer, frequent fetal surveillance To determine whether or not there is further deterioration.

Absent umbilical artery diastolic flow (AUADF)

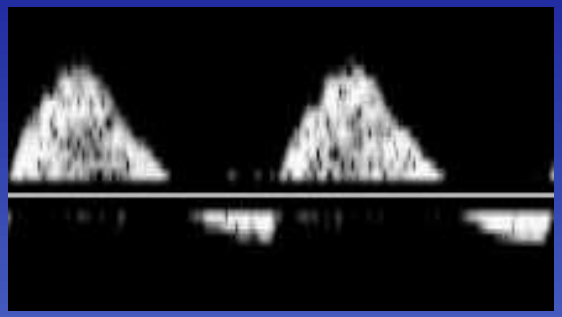


•UA blood flows only during systole as a result, the oxygen supply to the fetus is decreased and mild metabolic acidosis.

•Occurs days to weeks prior to abnormalities found on other measures of fetal health - NST, BPP, CST, these indicating urgent delivery.

May not affect long-term neurological outcome

Reversed umbilical artery diastolic flow (RUADF)



•“Fetus to placenta” an ominous sign, blood flow is reversed during diastole, fetuses need to be delivered promptly.

At risk of neonatal death and significant morbidity.

Fetal cerebral circulation

- In mild hypoxia – UA resistance increased, no change in MCA - adaptation of fetal circulation
- In progressive hypoxia – 'Brain sparing effect' presence of such compensation suggest a compromised fetus
- Doppler waveform depicts – increased diastolic flow with decreased pulsatility index

Fetal cerebral circulation

- Continuing hypoxia – the over stressed fetus loses the brain sparing effect – diastolic flow returns to normal

- Reflects a terminal de-composition in the setting of acidemia or brain edema

Reversal of diastolic flow grave and irreversible fetal neurological outcome