

CTG

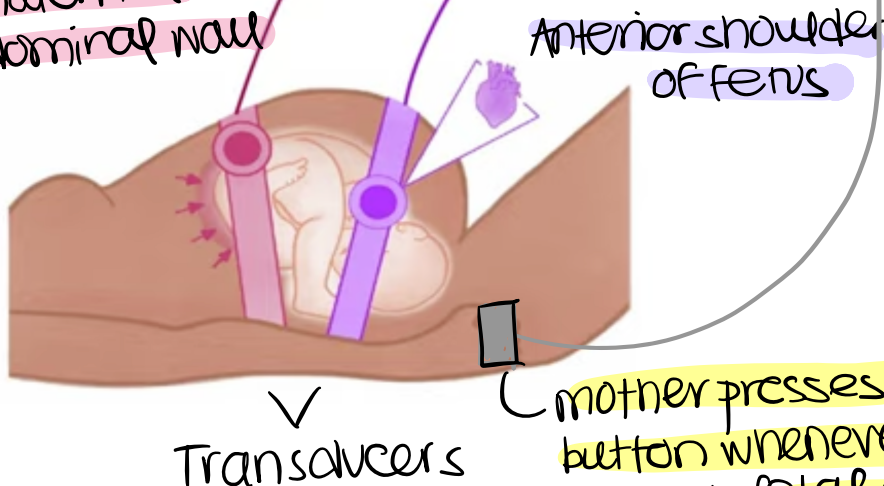
Cardiotocography

- ⇒ Monitor fetal $\heartsuit$ rate
- ⇒ Monitor uterine contractions
- * commonly used in the 3rd trimester
- * can detect fetal distress

HOW?

indication of intrauterine pressure indirectly

measuring tension in maternal abdominal wall



Transducers

Anterior shoulder of fetus

mother presses button whenever she feels fetal movement

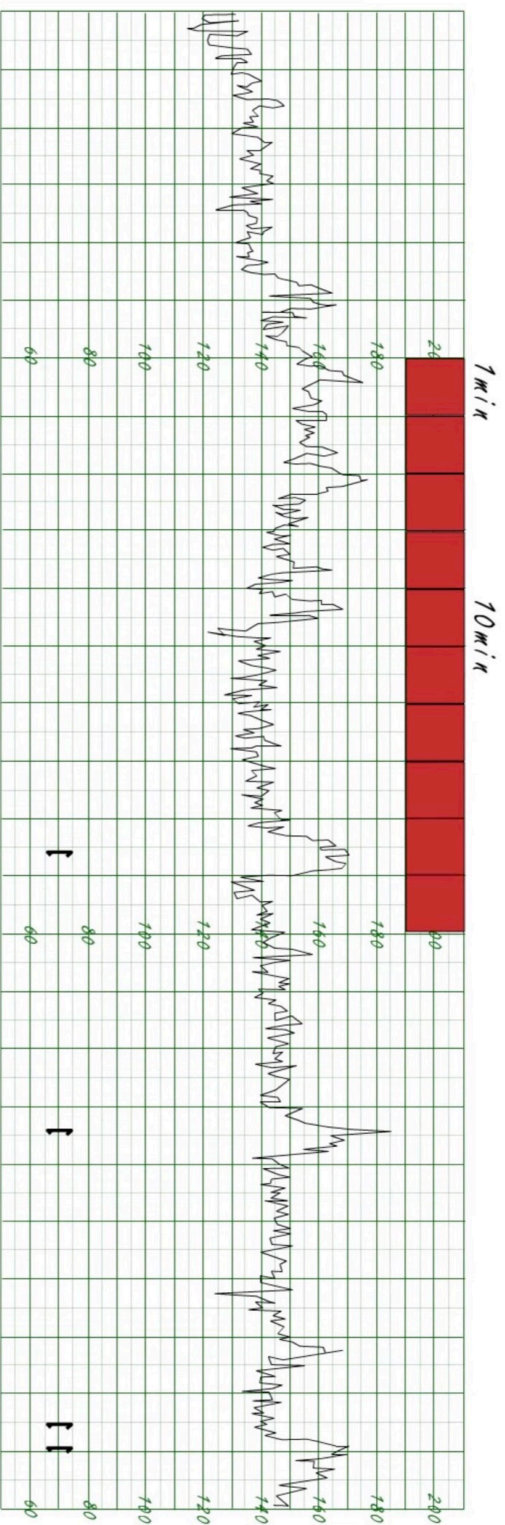
fetal $\heartsuit$ rate

tocometry measurement



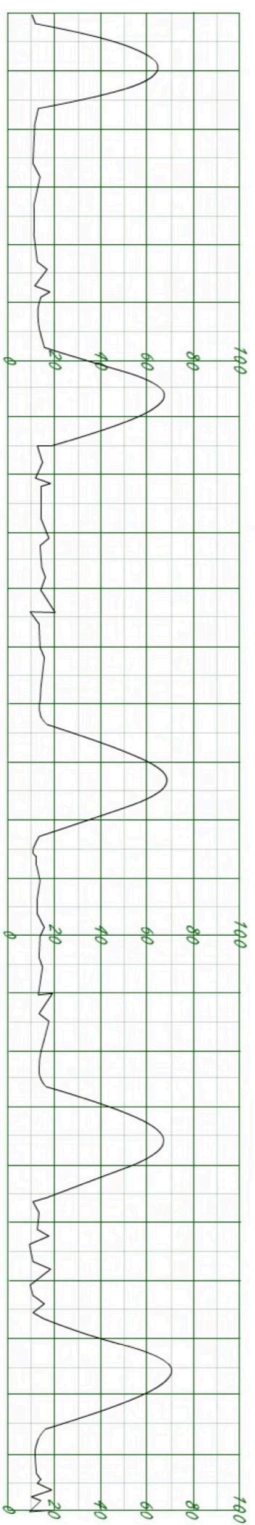
CTG

* can also measure BP & maternal $\heartsuit$ rate



**FETAL HEART
TRACE**

**FETAL
MOVEMENTS**



TOCOMETRY

DR C BRAVADO

DR Define Risk

High/low risk pregnancy?

e.g: meconium stained liquor

: fever

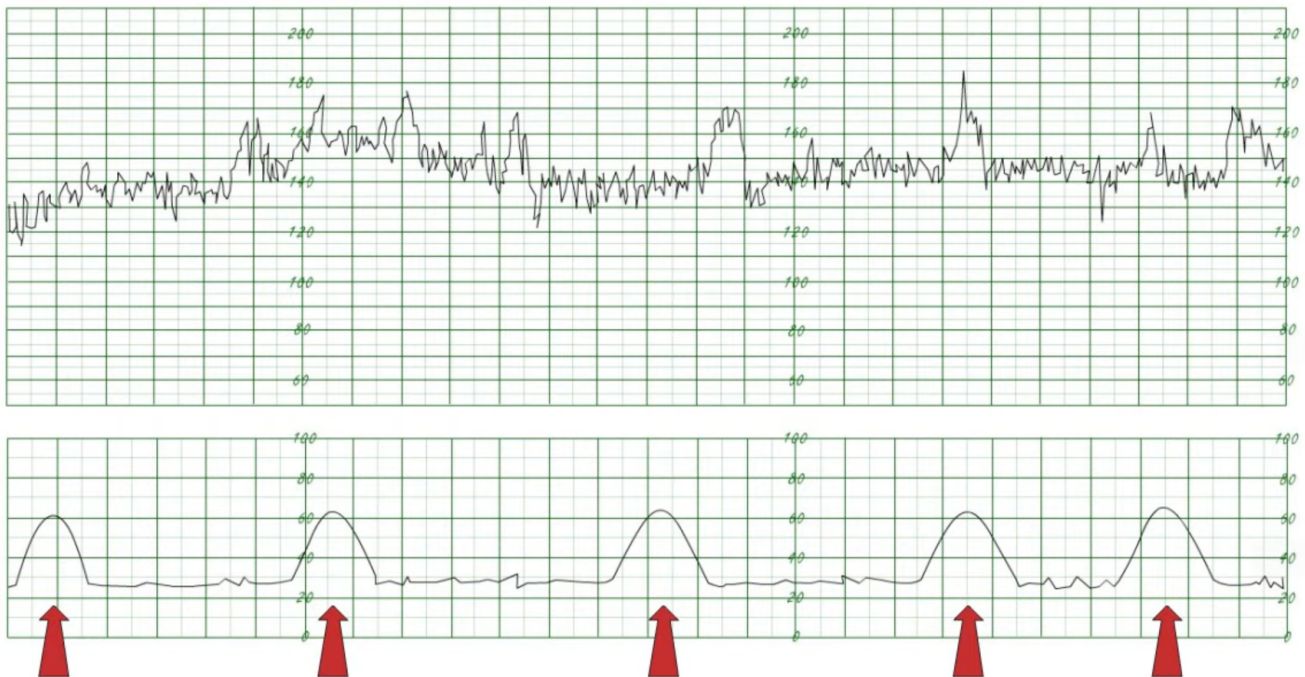
: intrauterine growth restriction (IUGR)

C Contractions

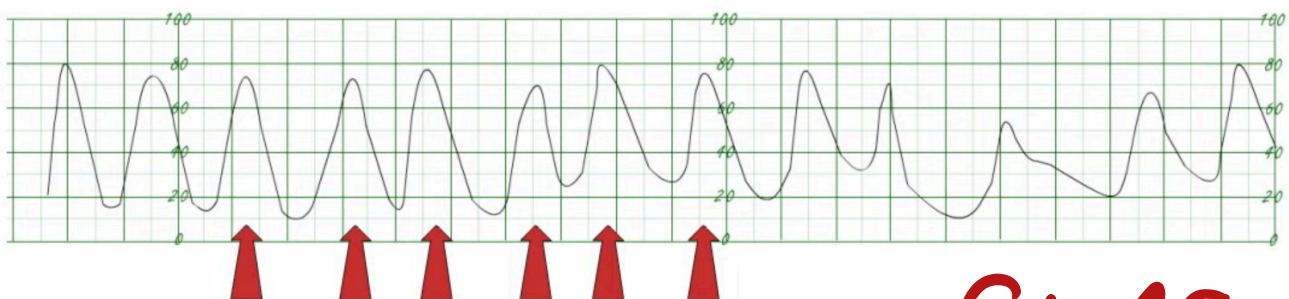
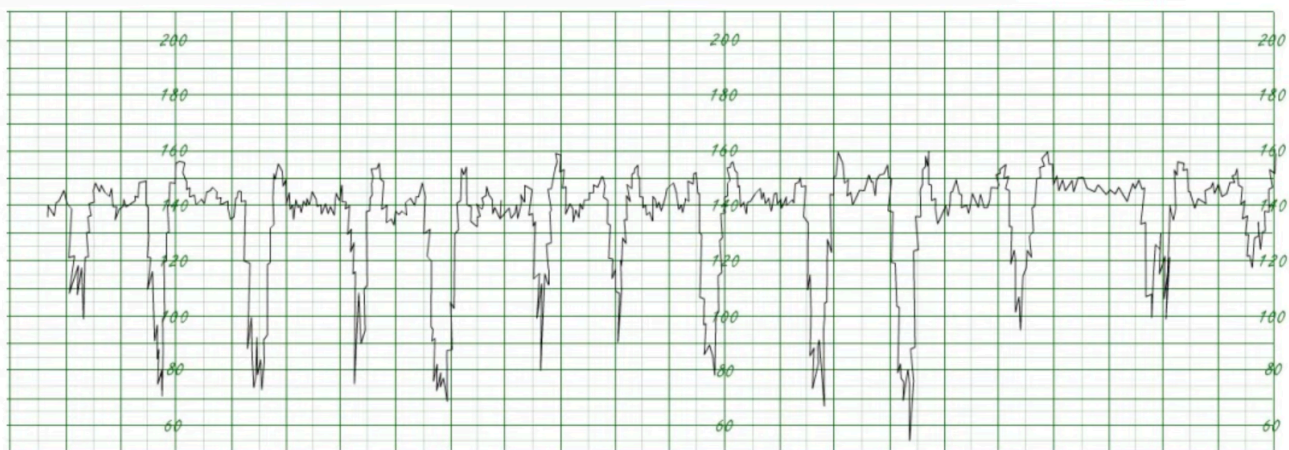
* Frequency: # of contractions in 10 min

* Duration

⚠ in labor, aim for toco 4-5 in 10 min



2 in 10



can result
in abnormal
fetal $\heartsuit$ rate

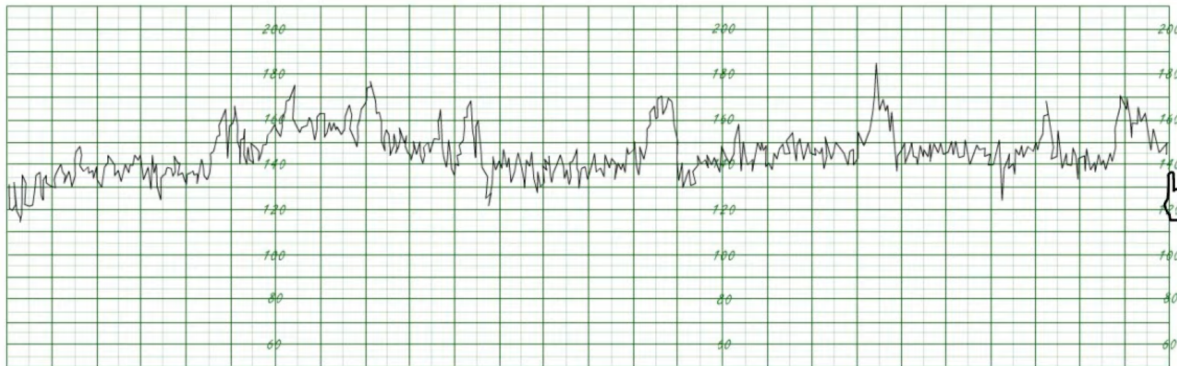


6 in 10
Hyperstimulation

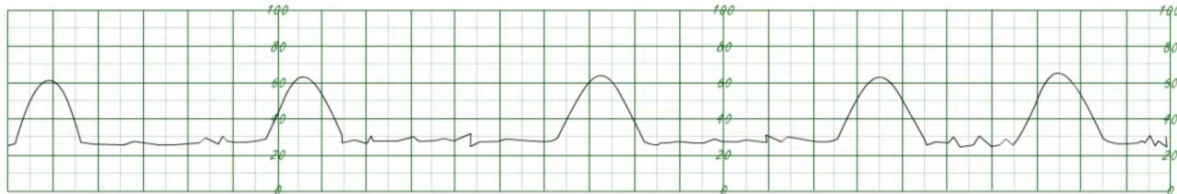
BRA Baseline Rate

Average $\heartsuit$ rate of the fetus

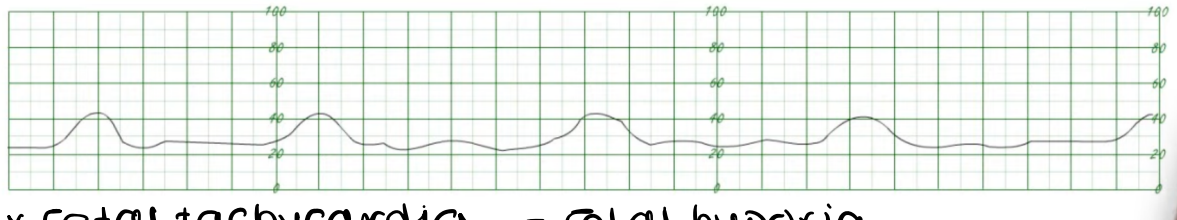
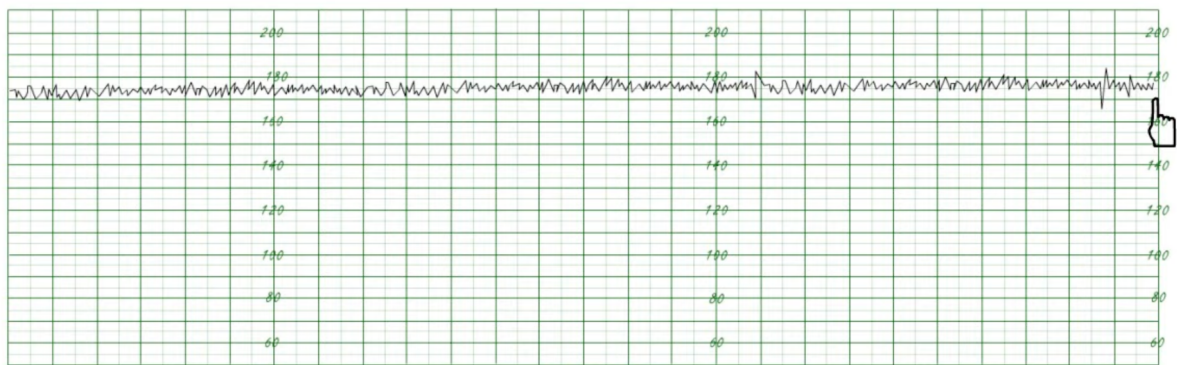
Normal FHR = 110-160 BPM



BVR =
140bpm



BVR =
175bpm



*fetal tachycardia - fetal hypoxia
- chorioamnionitis
 Δ always check maternal temp

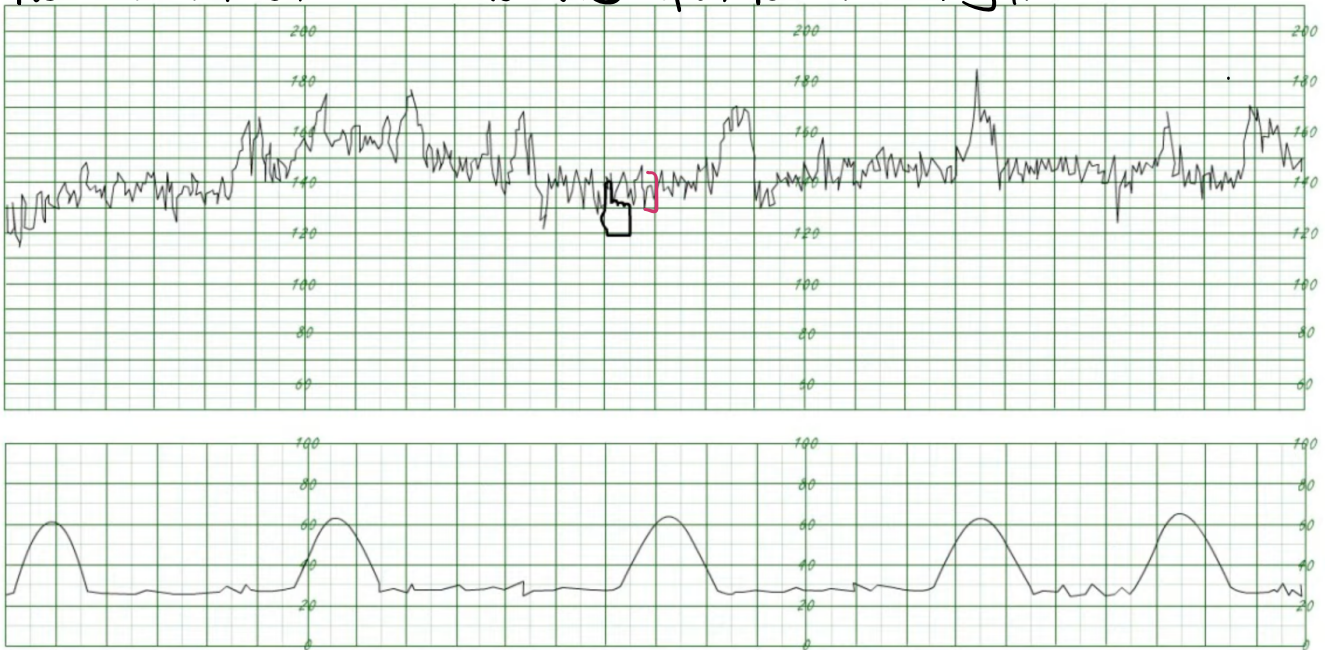
V Variability

= beat to beat variability

Variation in FHR from one beat to the next

Normal range = 5-25 BPM

how much the trace is moving up & down along the base line



Good variability: indicates intact neurological system in the fetus
&
is a good indicator of how healthy a fetus is.

→ minimal variation in FHR between beats

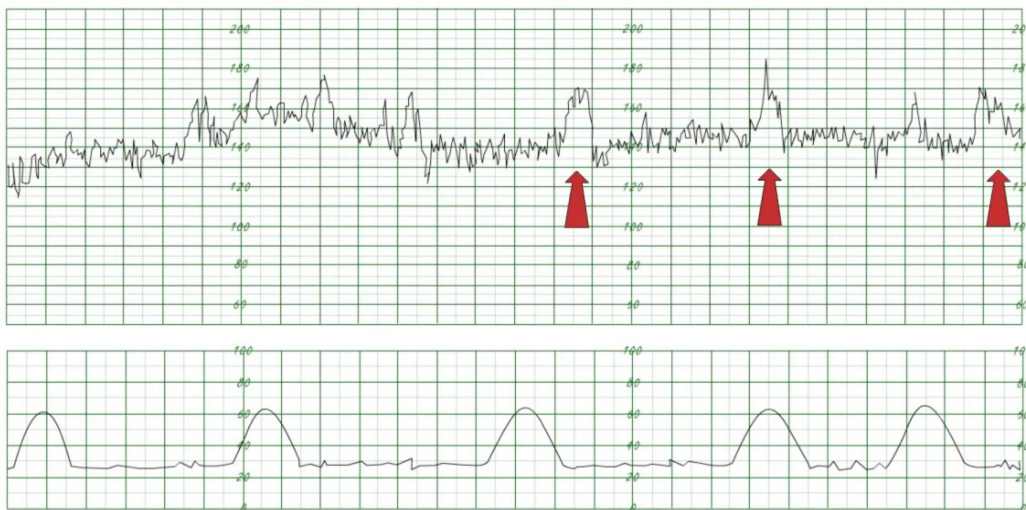


Decreased variability - fetal sleep
(should not last > 40 min)
- fetal hypoxia
- Drugs: opiates, magnesium sulphate

A

Accelerations

Abrupt increase in FHR > 15 bpm for > 15s
x a sign of a healthy fetus (fetal movement)



Fetal physiology

↓ Myocardial Workload
(to use up less O_2)

by ↓ **FHR** = deceleration

⚠ Aim is to ↓ amount of O_2 being consumed by $\heartsuit$ & divert it to other vital organs i.e brain

↓
NO Accelerations

⚠ fetus will try to conserve energy & O_2 available by not moving

↓ if hypoxia progresses

Release of catecholamines

(help fetus conserve further O_2)

1. ↑ HR to get oxygenated blood from placenta (↑ in baseline FHR)
2. Peripheral vasoconstriction to redistribute blood to vital organs.
3. Glycogenolysis to ↑ energy supply (to be used by fetal $\heartsuit$)

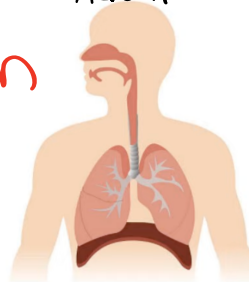
COMPENSATED RESPONSE

↳ on CTG stable baseline rate with ✓ variability.

HYPOXIA

↓ O_2

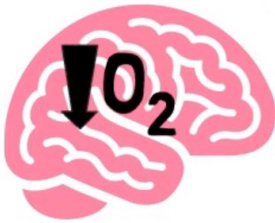
Normal Adult



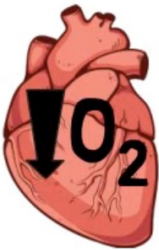
→ ↑ **RR**, not possible for fetus submerged in amniotic fluid.



DECOMPENSATION



loss of baseline
fHR variability



myocardial
hypoxia & acidosis
unstable baseline
「stepwise pattern to death」

ABCDE approach to predict next change in the CTG

Hypoxia begins with deceleration



Acceleration disappears



Baseline FHR $\uparrow$



Compensated stress (stable baseline FHR & normal variability)



Decomensation (unstable baseline & changes in variability)



End stage myocardial failure + "step ladder" pattern to death Δ

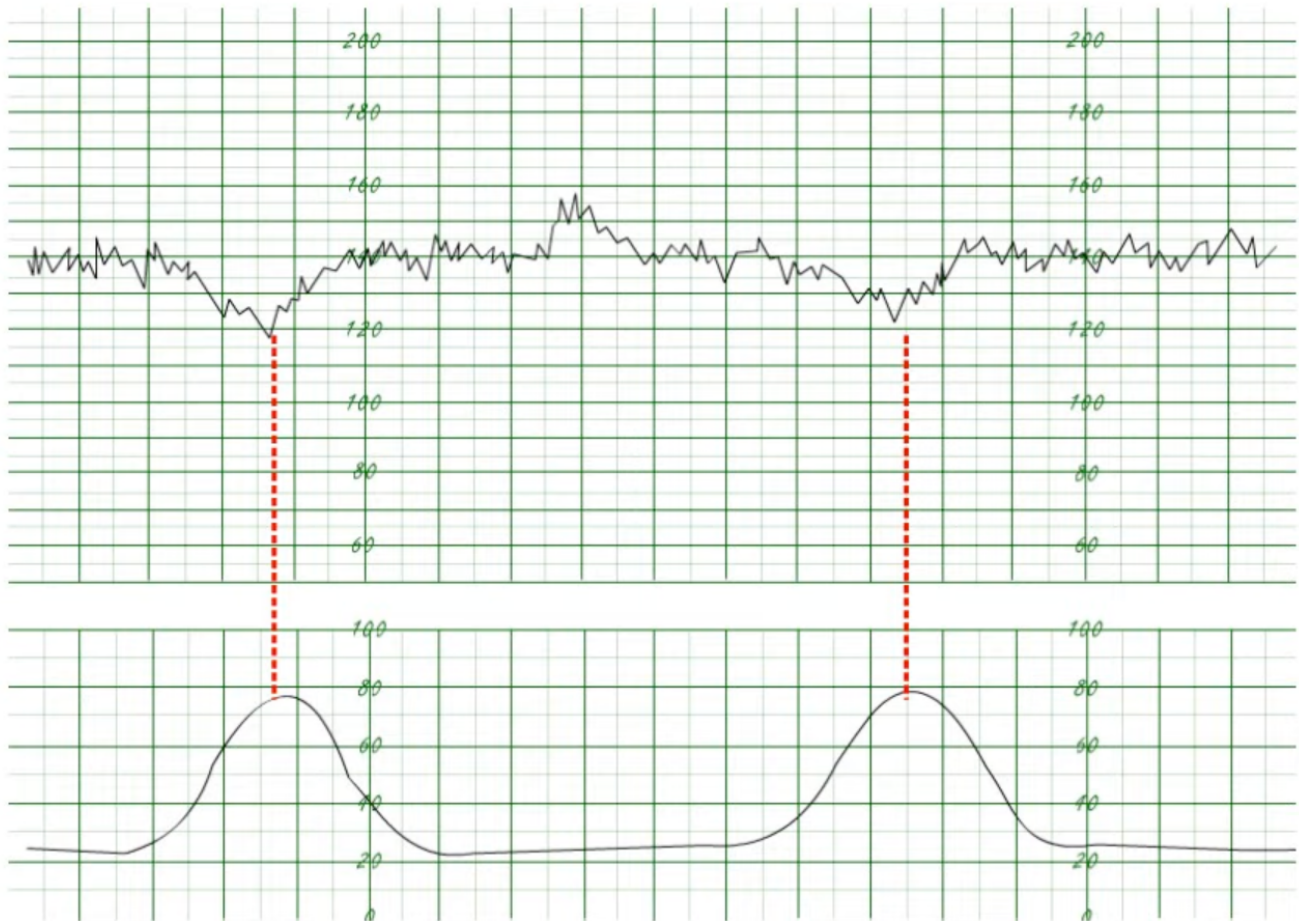
D Decelerations

Decrease in the FHR by ≥ 15 bpm for ≥ 15 s

- * 3 types: $\Rightarrow$ Early
- $\Rightarrow$ Variable
- $\Rightarrow$ Late

Early Decelerations

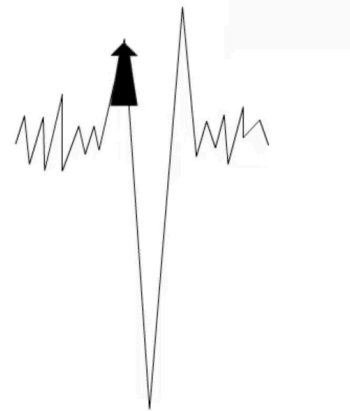
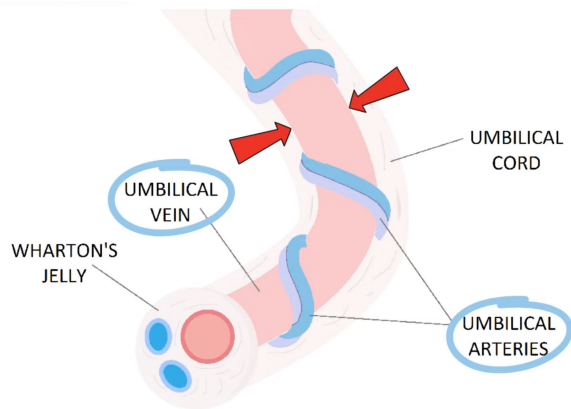
- Trough of deceleration coincides with peak of contraction.
「start when uterine contraction begins & recovers when UC stops」
- secondary to head compression
 - : During uterine contractions, $\uparrow$ fetal ICP which $\uparrow$ vagal tone, $\uparrow$ HR.
 - : quickly resolves once UC ends.
- uncommon
- not considered physiological or pathological



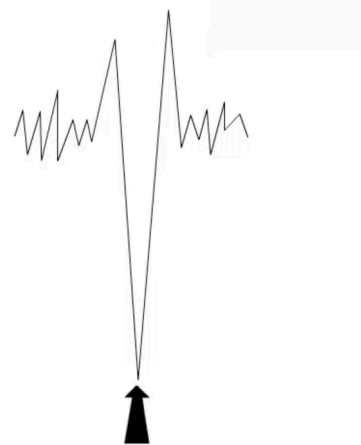
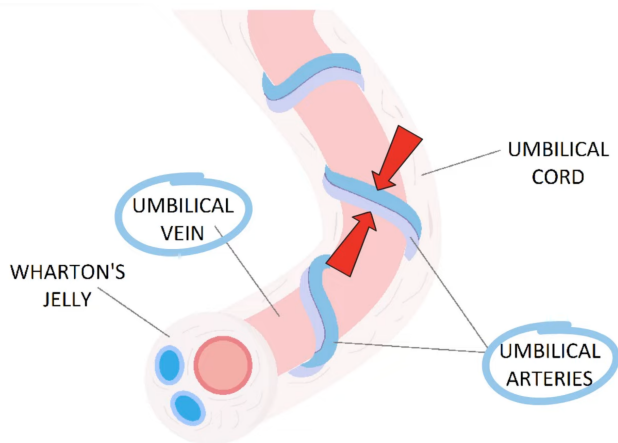
Variable Decelerations

- ~ 80-90% of decelerations
- vary in shape, form & timing in relation to contractions.
- typically have a rapid fall in baseline HR with a variable recovery phase
- secondary to umbilical cord compression

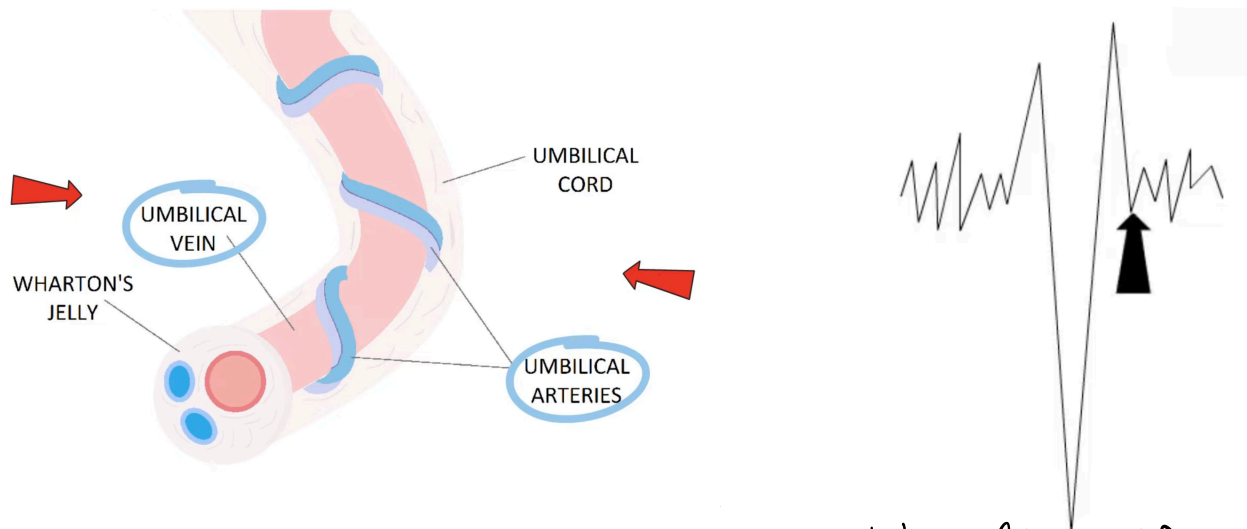
↓



> vein occluded first : **acceleration**



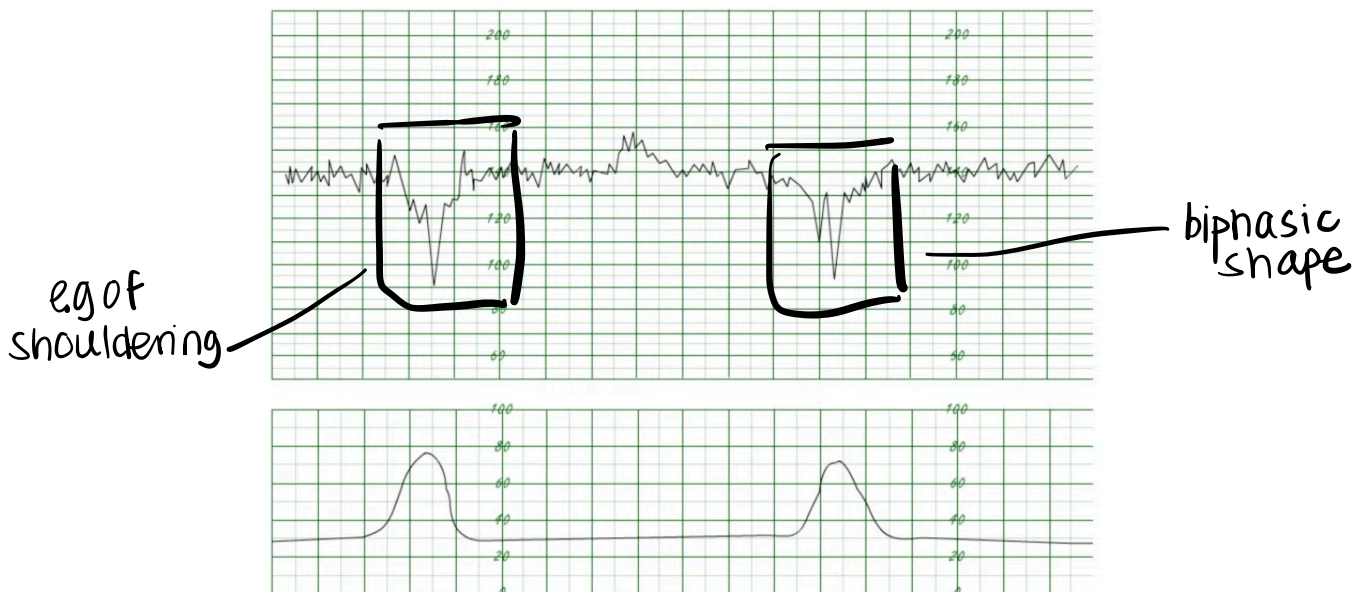
> Arteries occluded next : **Deceleration**



> pressure released : acceleration & FHR returns to baseline

* Accelerations before & after the variable decelerations : **Shouldering**

↳ indicate fetus is not yet hypoxic & is compensating well.



Concerning Characteristics:

- lasting > 60 sec
- biphasic shape
- no shouldering
- reduced baseline variability within deceleration
- Failure to return to baseline

Late Decelerations

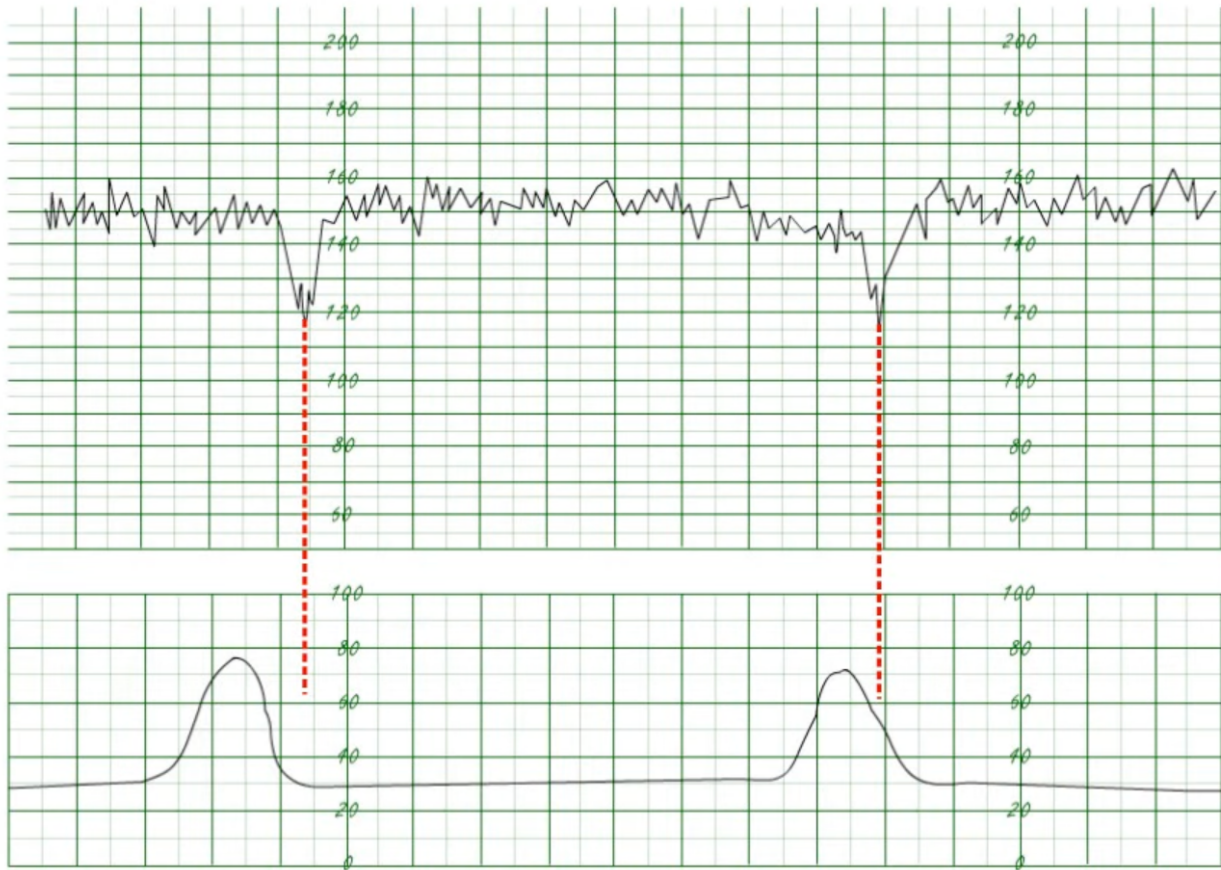
- start at the peak of the UC & recover after the contraction ends.

- secondary to uteroplacental insufficiency (insufficient blood flow to uterus & placenta)

↳ ↓ blood flow to fetus → hypoxia
&
acidosis

* maybe secondary to:

- maternal hypotension
- preeclampsia
- uterine hyperstimulation



0

Overall impression

CTG is :



NORMAL



SUSPICIOUS



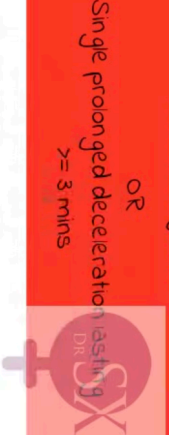
PATHOLOGICAL

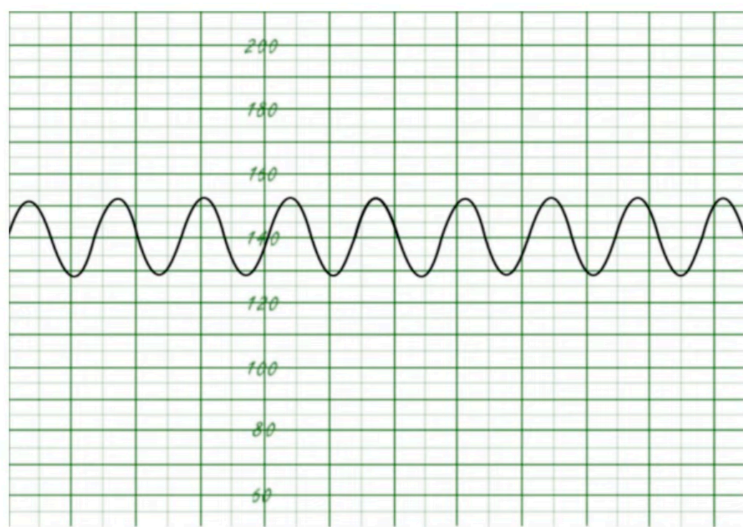
NICE CTG CLASSIFICATION

	REASSURING	NON-REASSURING	ABNORMAL
Baseline rate (bpm)	110 - 160	100 - 109 OR 161 - 180	< 100 OR > 180
Baseline Variability (bpm)	5 - 25	< 5 for 30 - 50 mins OR > 25 for 15 - 25 mins	< 5 for > 50 mins OR > 25 for > 25 mins OR Sinusoidal pattern
Decelerations	None or early variable decelerations with no concerning characteristics for < 90 mins	variable decelerations with no concerning characteristics for >= 90 mins OR variable decelerations with any concerning characteristics in up to 50% of contractions for >= 30 mins OR variable decelerations with any concerning characteristics in > 50% of contractions for < 30 mins OR late decelerations in > 50% of contractions for < 30 mins	variable decelerations with any concerning characteristics in > 50% of contractions for 30 mins OR late decelerations for 30 mins OR Acute bradycardia OR Single prolonged deceleration lasting >= 3 mins

CONCERNING CHARACTERISTICS OF VARIABLE DECS:

- Early > 60 sec
- Biphasic shape
- No shortening
- Reduced baseline variability with a drift
- Failure to return to baseline





↳ anemia

ALL Reassuring
features



NORMAL



Continue same

1 Non-Reassuring feature
AND
2 Reassuring features



SUSPICIOUS



Conservative measures to correct any
underlying causes:

- Umbilical cord
compression



Change position
(left lateral)

- Maternal
hypotension



IV fluids

- Uterine
hyperstimulation



Stop Syntocinon

1 Abnormal feature
AND
2 Non-Reassuring features



PATHOLOGICAL



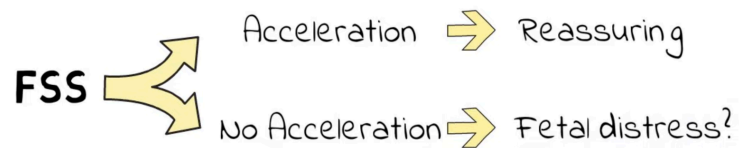
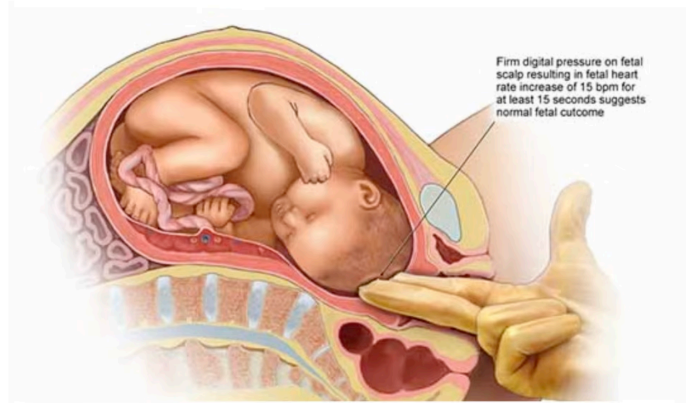
Conservative measures

Consider fetal scalp stimulation

Consider Fetal Blood Sampling (FBS)

Consider expediting delivery

FETAL SCALP STIMULATION



FETAL BLOOD SAMPLING

* 7.2-7.25
⇒ repeat

* <7.2
↓
deliver

