

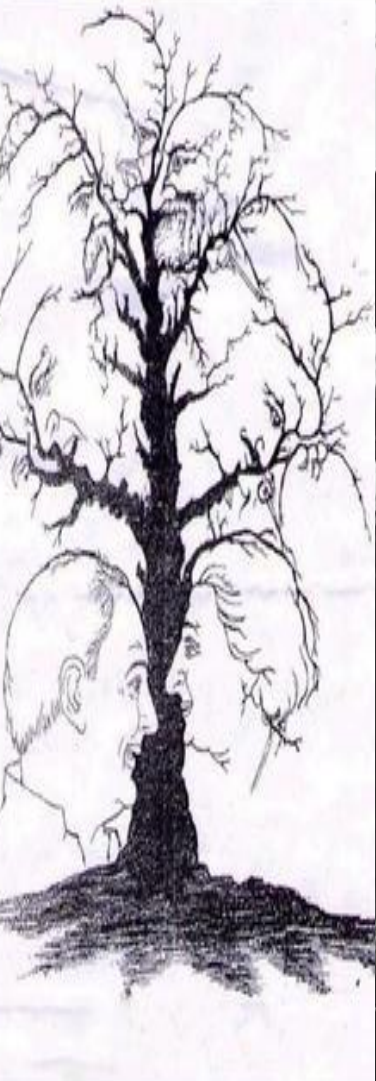
Intrapartum fetal monitoring

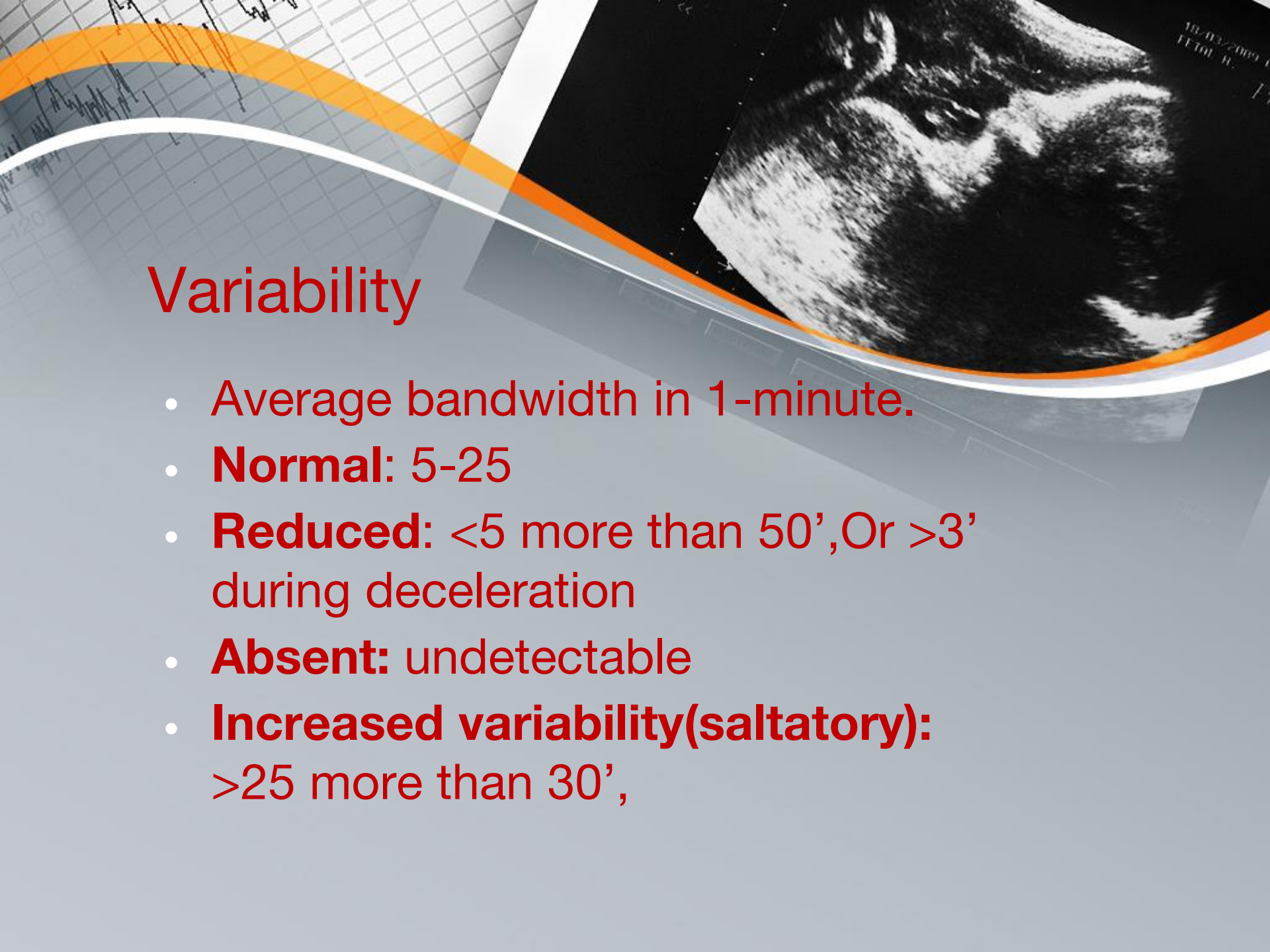
Dr Sanaz Mousavi



CTG features

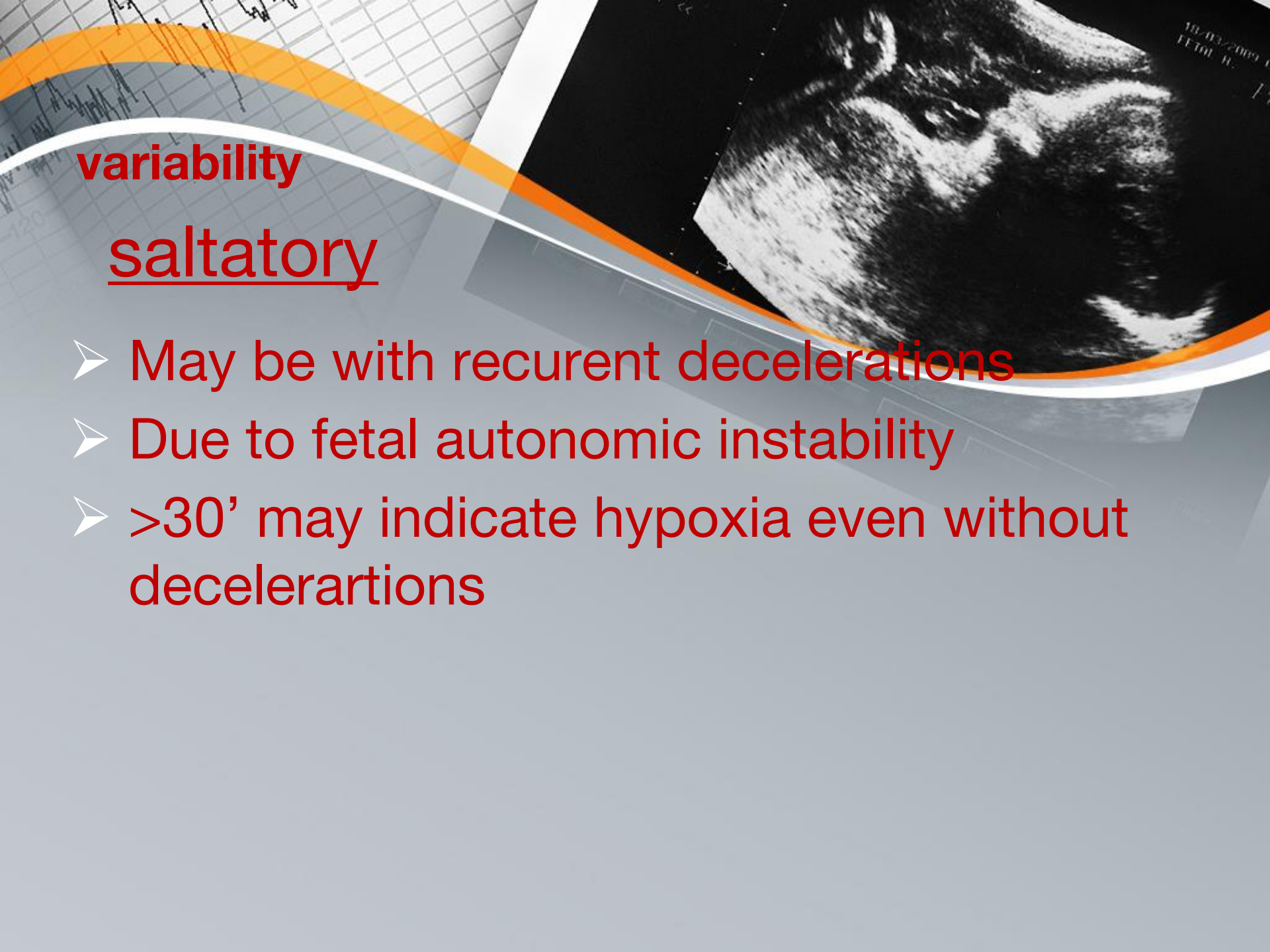
- **Base line** heart rate: minimum of 2 minutes in 10 minute segment (110-160)
- Tachycardia: >160 , more than 10 minutes
- Bradycardia :





Variability

- Average bandwidth in 1-minute.
- **Normal:** 5-25
- **Reduced:** <5 more than 50', Or $>3'$ during deceleration
- **Absent:** undetectable
- **Increased variability(saltatory):** >25 more than 30',



variability

saltatory

- May be with recurrent decelerations
- Due to fetal autonomic instability
- >30' may indicate hypoxia even without decelerations

Sinusoidal pattern

Regular

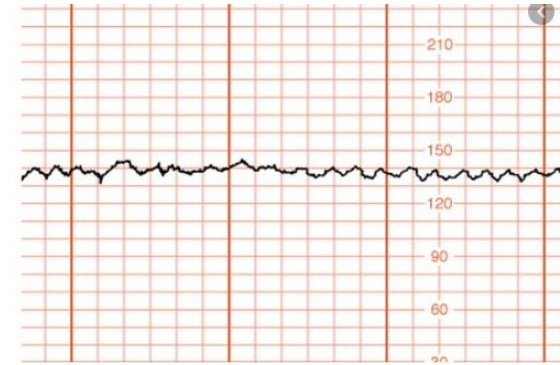
Amplitude of 5-15b/m

Frequency of 3-5 c/m

>30'

Absent accelerations

Pathophysiology: severe fetal anemia, hypoxia, infection, cardiac malformations



A hand is holding a piece of white paper with a jagged, irregular line drawn on it, resembling a pseudo-sinusoidal pattern. The background is blurred, showing a blue object at the bottom.

Pseudo-Sinusoidal pattern

More jagged appearance

Duration < 30' (discriminate)

NI patterns before and after

Caused by: analgesic, fetal mouth movement

A hand is holding a piece of white paper with a black line tracing on it, which appears to be a fetal heart rate (FHR) tracing. The tracing shows a series of peaks and troughs. The background is slightly blurred, showing a blue surface at the bottom and a light-colored surface at the top.

Accelerations

Abrupt (onset to peak < 30 sec)
 > 15 b/m

Lasting > 15 sec, $< 10'$

Before 32 weeks (10 sec, 10 b/m)

Decelerations

>15 sec

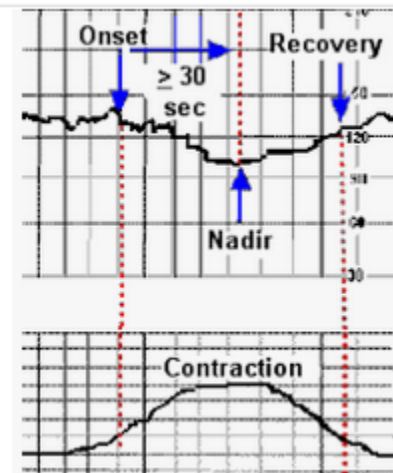
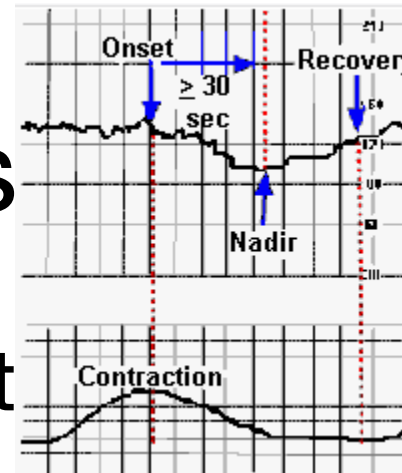
Early decelerations

Onset to nadir >30 sec

Normal variability

Late first stage and second stage of labor

Do not indicate hypoxia



Variable decelerations:

Onset to nadir <30 sec

Seldom associated with hypoxia- acidosis (if u shape, 60 criteria with decreased or increased variability)

Late deceleration:

Onset/end to nadir >30 sec

Starts >20 sec after the end of contraction

Fetal hypoxia

In trace without acceleration and reduced variability include 10-15 b/m

A hand is holding a piece of white paper with a black line tracing on it, which appears to be a fetal heart rate monitor strip. The tracing shows a significant drop in the heart rate, characteristic of a deceleration. The background is slightly blurred, showing a blue surface.

Decelerations

Prolonged decelerations:

>3 min

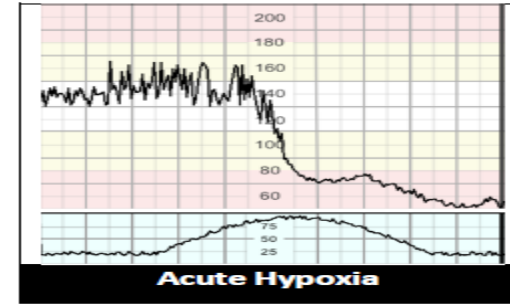
Hypoxia

Intrapartum hypoxia generally follows one of 3 pathways:

- **1. Acute Hypoxia**
- **2. Subacute Hypoxia**
- **3. Gradually Evolving Hypoxia**
- **4. Chronic Hypoxia**



Acute hypoxia:

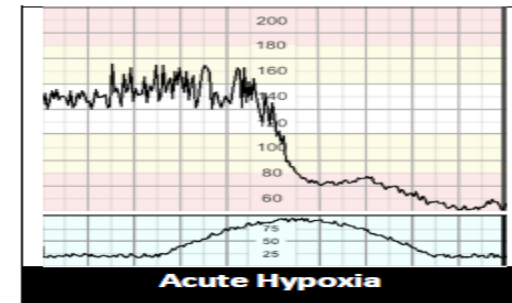


- Presents as: prolonged deceleration >5 min or >3 min with ↓ variability
- **Cause:** 3 Accidents
- § Cord prolapse / § Placental Abruption / § Uterine Rupture
- 2 Iatrogenic
- § Maternal Hypotension (usually secondary to supine hypotension or epidural) § Uterine hyperstimulation (by oxytocin / PGs) or
- spontaneous increased activity
- Fetal PH drops 0.01/ min

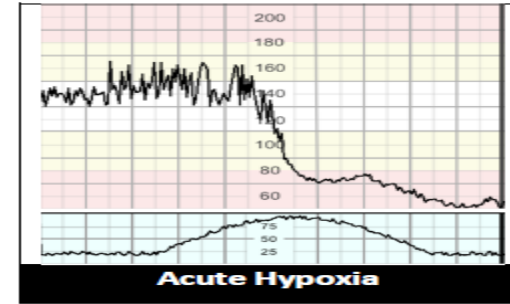
1-Acute hypoxia:

Management : 3- minute rule

- 0-3: deceleration > 3 min: summon the on call team
- 3-6: diagnose the cause, if an accident is diagnosed: immediate delivery as soon as safely
- If an iatrogenic cause is diagnosed: immediate measures to correct (avoiding supine position, stopping uterine stimulants, starting IV fluids, and administering tocolytics.)
- 6 – 9: Signs of recovery (return of variability and improvement in heart rate) should be noted, If no signs of recovery are noted, preparation for immediate delivery MUST be started.
- 9 – 12: By this point in time the deceleration has either recovered, or preparation for a delivery fetus by 12 – 15 minutes.

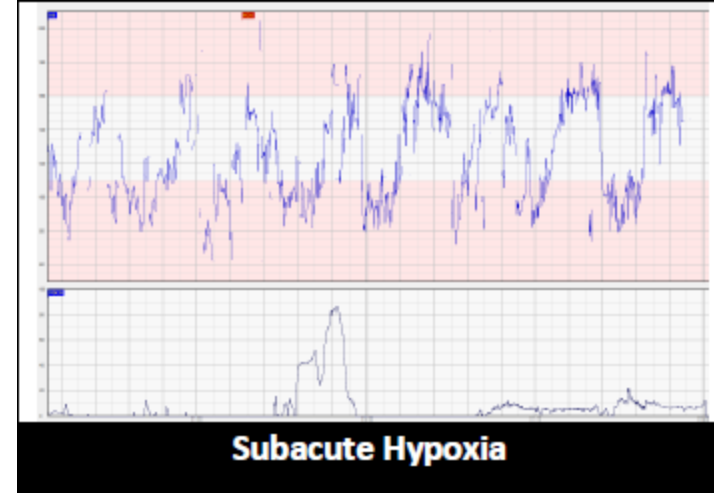


Important Notes:



- Do not follow the 3-minute rule if the deceleration is preceded by reduced variability and lack of cycling,
- immediate preparation to delivery by the safest and fastest route
- If normal variability and cycling before and during the first 3 minutes of the deceleration, it is likely that 90% will recover within 6 minutes, and 95% in 9 minutes, if acute accidents have been excluded

2. Subacute Hypoxia

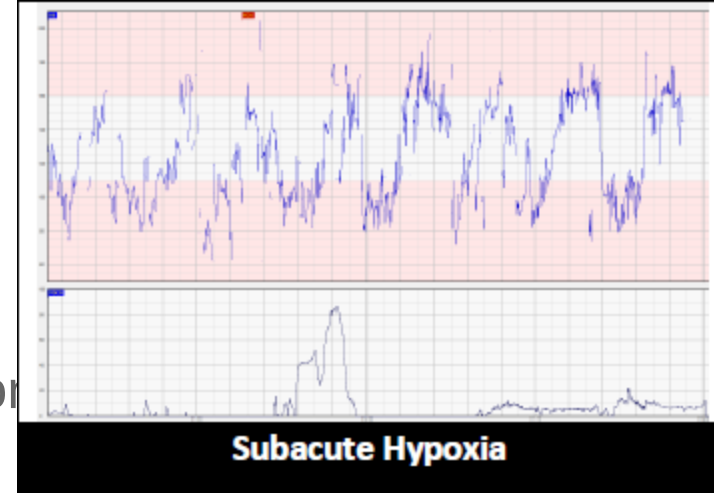


- **Presents** on the CTG by the fetus spending most of the time in decelerations.
- This is almost invariably **caused** by uterine **hyperstimulation.**
- **Fetal pH drops** at a rate of 0.01 / 2-3 minutes



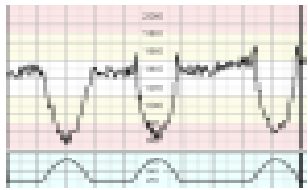
2. Subacute Hypoxia Management:

- 1. Stopping / reducing uteroton
 - 2. Avoiding supine position
 - 3. Starting IV fluids
 - 4. Administering tocolytics if hyperstimulation persists despite previous measures
 - 5. Expediting delivery if hypoxia persists despite tocolysis (AVD / CS)
-
- If encountered in the **second stage** of labour:
 - **1**-ask mother to stop pushing to recovery of the fetus
 - **2**-If no improvement in 10 minutes, expedite delivery.
 - **3**-Once stable recommence pushing.
 - **4**-If subacute hypoxia recurs, expedite delivery.

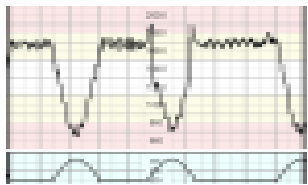


3. Gradually Evolving Hypoxia

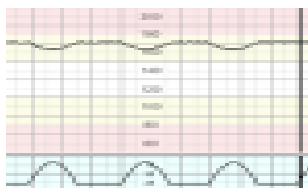
Gradually Progressive Hypoxia



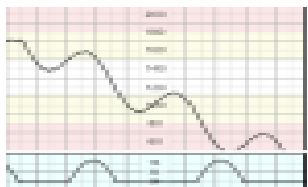
Decelerations



Rise in baseline



Reduced variability



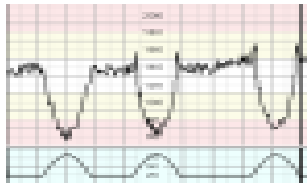
Terminal heart failure

- • This is the **most common** type of hypoxia in labour
- • During this process, the fetus has the same changes that a normal adult would show during exercise
- • This tends to **present** with the following order:
 1. Evidence of hypoxic stress (decelerations)
 2. Loss of accelerations and lack of cycling
 3. Exaggerated response to hypoxic stress (decelerations become wider and deeper)
 4. Attempted redistribution to perfuse vital organs facilitated by catecholamines (first sign noted is a rise in baseline)
 5. Further redistribution with vasoconstriction affecting the brain (reduced baseline variability)
 6. Terminal heart failure (unstable/ progressive decline in the baseline - “step ladder pattern to death”)

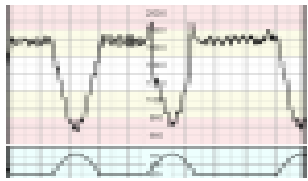
3. Gradually Evolving Hypoxia

Important Notes:

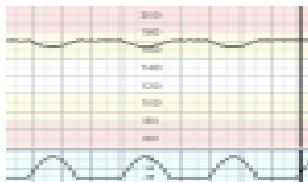
**Gradually
Progressive Hypoxia**



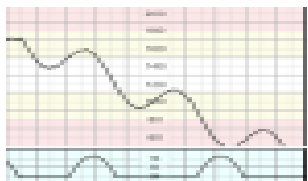
Decelerations



Rise in baseline



Reduced variability

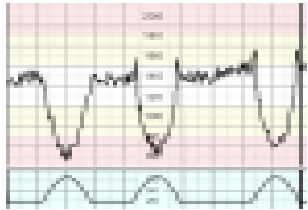


Terminal heart failure

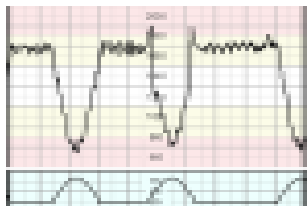
- Stages 1– 4 : evidence of stress with fetal **compensation**.
- Stages 5 – 6 : evidence of stress with fetal **decompensation**. (reduced variability, “step ladder pattern to death)
- Stages 4 & 5 : may be reversible although prolonged episodes of hypoxia can lead to fetal organ damage.

3. Gradually Evolving Hypoxia **Management**

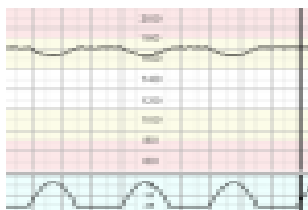
**Gradually
Progressive Hypoxia**



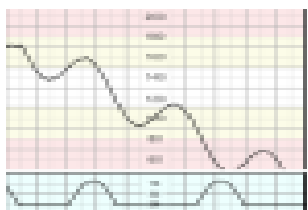
Decelerations



Rise in baseline



Reduced variability

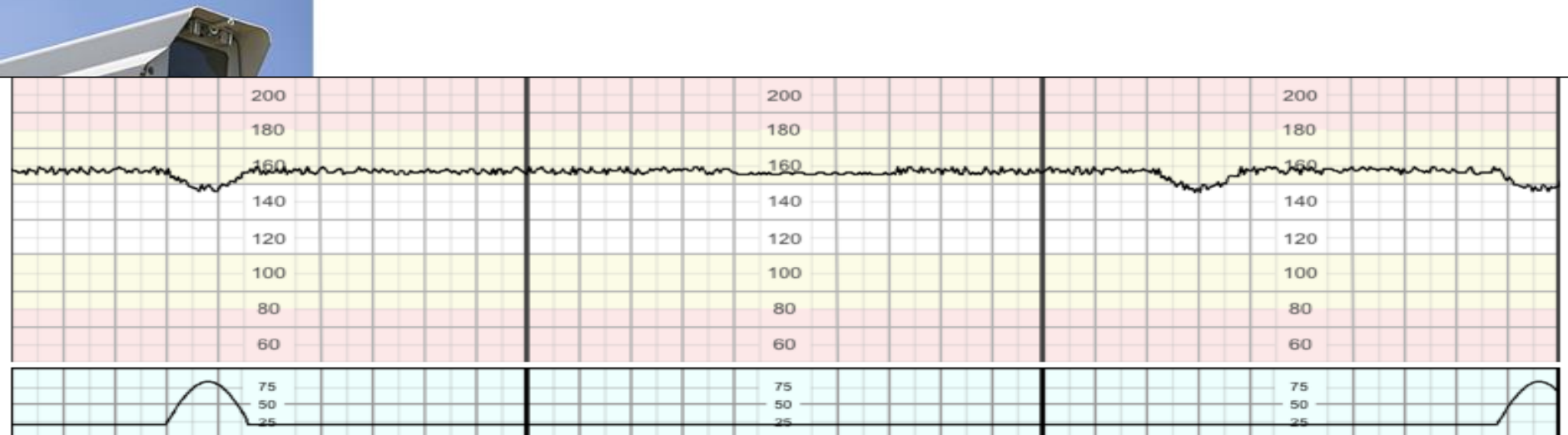


Terminal heart failure

- **Management** of gradually progressive hypoxia is by improving fetal
- conditions with the first signs of redistribution to avoid internal organ
- damage. (stage 4).

4. Chronic Hypoxia

- antenatal type of hypoxia with implications for intrapartum care
- • **Presents** as a **baseline** at the upper end of normal associated with ↓ **variability** &
- blunted responses (**infrequent accelerations** and lack of cycling) and is frequently associated with
- shallow **decelerations**.
- • This represents a fetus with reduced reserve and increased susceptibility to hypoxic injury during labour.
- • potentially Increasing the risk of hypoxia, with low threshold for surgical intervention.



Chronic Hypoxia

4. Chronic Hypoxia

Table 3 - Checklist to exclude chronic hypoxia and pre-existing fetal injury Pereira and Chandrarahan 2017

1	Baseline fetal heart rate appropriate G.A.	Yes	No
2	Normal variability and cycling	Yes	No
3	Presence of accelerations (not in labour or latent phase of labour)	Yes	No
4	No shallow/ late decelerations	Yes	No
5	Consider the wider clinical picture: meconium, temperature, fetal growth, reduced fetal movements	Yes	No
Overall Impression: Normal / Chronic Hypoxia / Other:			
Management Plan:			



Chronic Hypoxia

Intermittent auscultation(IA)

- Obstetric review and plan of care
 - CEFM in low risk: increased intervention
 - Method: no good evidence of frequency and duration
 - Every 15' in first and 5' in second stage
-
- Inclusion criteria:
 - 1-FM in preceding 24 hours
 - 2-At first 1' duration
 - 3-In early labor an acceleration should be noted
 - 4-Maternal pulse should palpated simultaneously
 - 5-Immediately after contraction and 1'
 - 6-Count FHR, don't rely on screen
 - 7-variability can not be detected



CTG interpretation

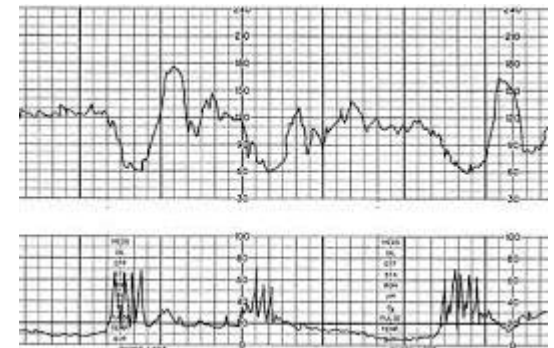
- Assess the trace:
- **Step 1**: The **clinical setting**
- o Current **gestational age**
- o **Antenatal events** (e.g. IUGR, PET, medications)
- o **Previous CTG traces** o Identified risks
- o **Contractions** (is the inter-contraction interval **more than 90 seconds**?)
- o **Baseline Heart rate**:
- § It is the most important on a CTG trace. **Compare baseline rates** on previous CTGs.
- § A change in baseline (by >10%) signifies a need for further attention. (In chronic hypoxia, more subtle changes to the baseline should also be considered significant).

Variability and Cycling:



CTG interpretation

- Accelerations:
- An acceleration starts from, and returns to the baseline.
- It is important to **differentiate accelerations from overshoots** (increase in FHR by accumulation of CO₂ during hypoxic episodes) and shouldering following decelerations with cord compressions.
- **Accelerations with contractions**, especially in the second stage : exclude maternal HR



CTG interpretation: Decelerations:

- **Repeated chemoreceptor decelerations** (late, prolonged, or reduced variability within deceleration) signify the placental stores are being depleted. can be corrected by changing maternal position, or increasing circulating volume by hydration, reducing the stress by reducing/stopping oxytocin. If this does not correct the situation it is important
- **Prolonged** decelerations (>5 minutes or >3 minutes with reduced variability) : 3-minute rule
- An isolated deceleration in non-labouring women is acceptable, however, repeated unprovoked decelerations in non-labouring women are a need for further investigation and assessment.



CTG interpretation

- Be aware that if the CTG parameters of baseline FHR and variability are normal, the risk of fetal acidosis is low



Actions in suspected fetal hypoxia

- **Excessive uterine activity:** (terbutaline) or nitroglycerine
- **Aorto-caval compression :**Turning mother to lateral
- **Transient cord compression** (variable decelerations) changing maternal position
- **ACTION WITH NO SUPPORTING EVIDENCE:**
- Oxygen in a well oxygenated mother, this does not alleviate fetal hypoxia

I.V. fluids in normotensive, well hydrated women



