BASIC concepts on INTRAPARTUM FETAL HEART RATE MONITORING

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OBSTETRICS AND GYNECOLOGY
REPRODUCTIVE ENDOCRINOLOGY AND INFERTILITY

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References

- Obstetrics and Gynecology 6th ed, 2010 (Beckmann CRB, Ling FW, Barzansky BM, Herbert WN, Laube DW, Smith RP editors); Chapter 9

- American College of Obstetricians and Gynecologists. Fetal Heart Rate patterns: monitoring, interpretation and management. ACOG technical bulletin 207, 1995.

- www.uptodate.com

- Various pictures take from the internet

Outline

- Electronic fetal monitoring
- Reporting findings for EFM
- Baseline fetal heart rate and contractions
- Variability
- Accelerations
- Decelerations
- Interpretation

Intrapartum fetal heart rate monitoring

- Modality intended to determine if a fetus is well-oxygenated
- **RATIONALE**: The rationale for intrapartum FHR monitoring is that identification of FHR changes potentially associated with inadequate fetal oxygenation may enable timely intervention to reduce the likelihood of hypoxic injury or death.
- 2 methods: intermittent auscultation and continuous electronic fetal heart rate (FHR) monitoring

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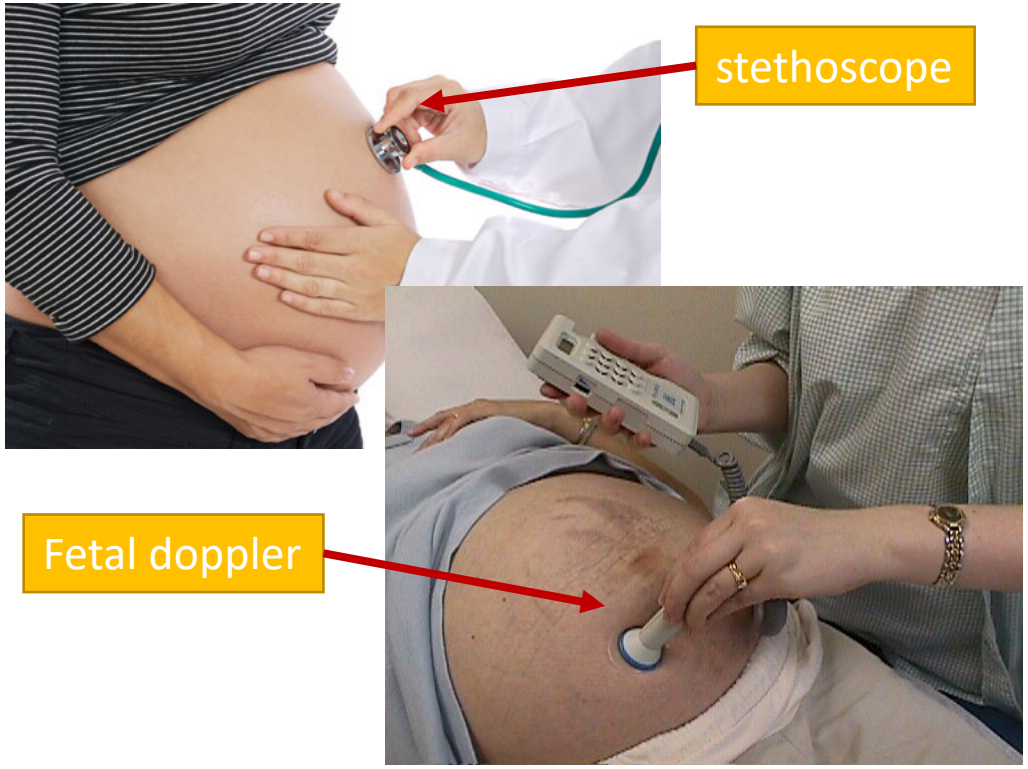
Intrapartum fetal heart rate monitoring

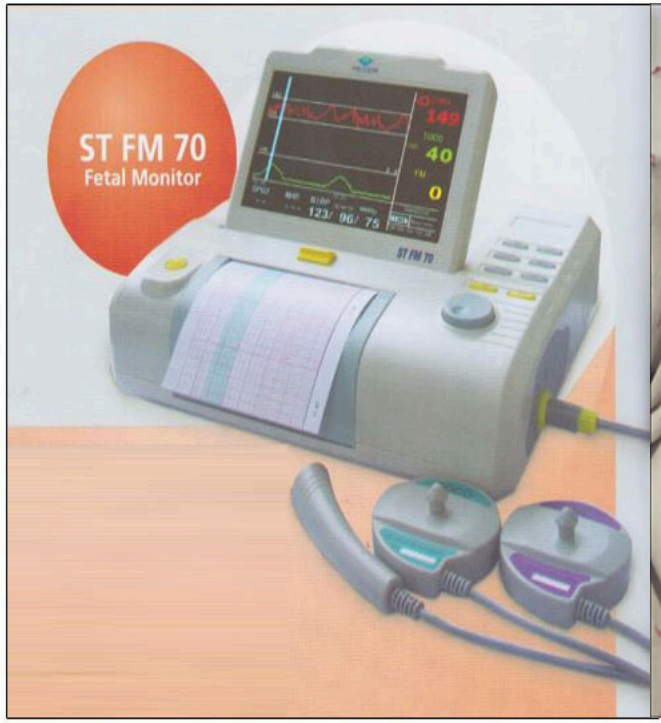
Intermittent



Continuous

Continuous Electronic Fetal Monitoring (EFM)

External



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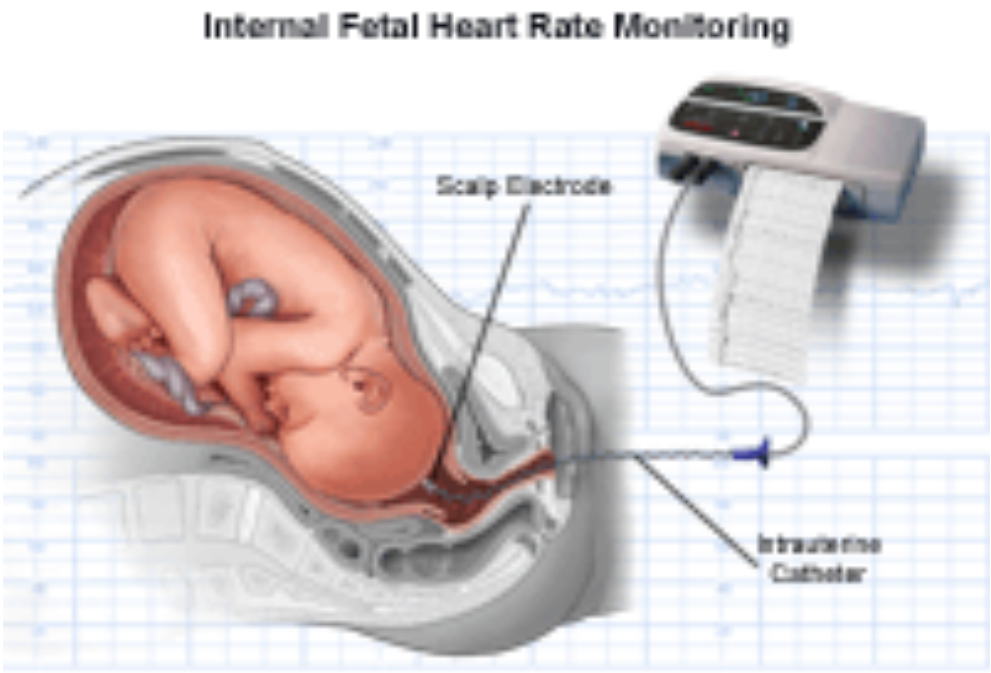

How often do we evaluate fetal heart rate?

	Auscultation		Continuous EFM	
	Low risk	High risk	Low risk	High risk
Active phase of 1st stage of labor	Evaluate and record FHR every 30 minutes, after a contraction	Evaluate and record FHR every 15 minutes ,after a contraction	Evaluate tracing every 30 minutes	Evaluate tracing every 15 minutes
Second stage of labor	Evaluate and record FHR every 15 min	Evaluate and record FHR every 5 min	Evaluate tracing every 15 minutes	Evaluate tracing every 5 minutes

American College of Obstetricians and Gynecologists. Fetal Heart Rate patterns: monitoring, interpretation and management. ACOG technical bulletin 207, 1995.

Reporting findings for electronic intrapartum fetal heart rate monitoring

- Baseline fetal heart rate
- Frequency and strength of contractions
- Variability (absent, minimal, moderate, marked)
- Accelerations (present/absent)
- Decelerations (present/absent)

- Interpretation: (category 1, 2, or 3)

Baseline fetal heart rate

- The mean FHR rounded to increments of 5bpm during a 10 minute segment, excluding accelerations and decelerations

- Normal range: 110-160 bpm

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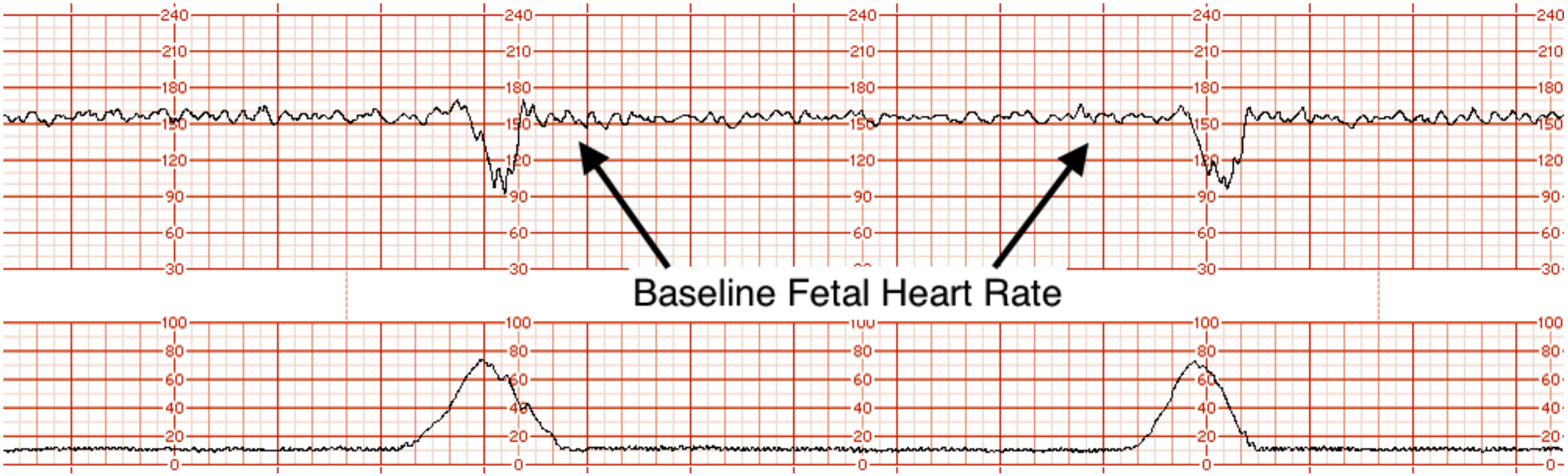
Baseline fetal heart rate and contractions



Tracing: 3cm/min

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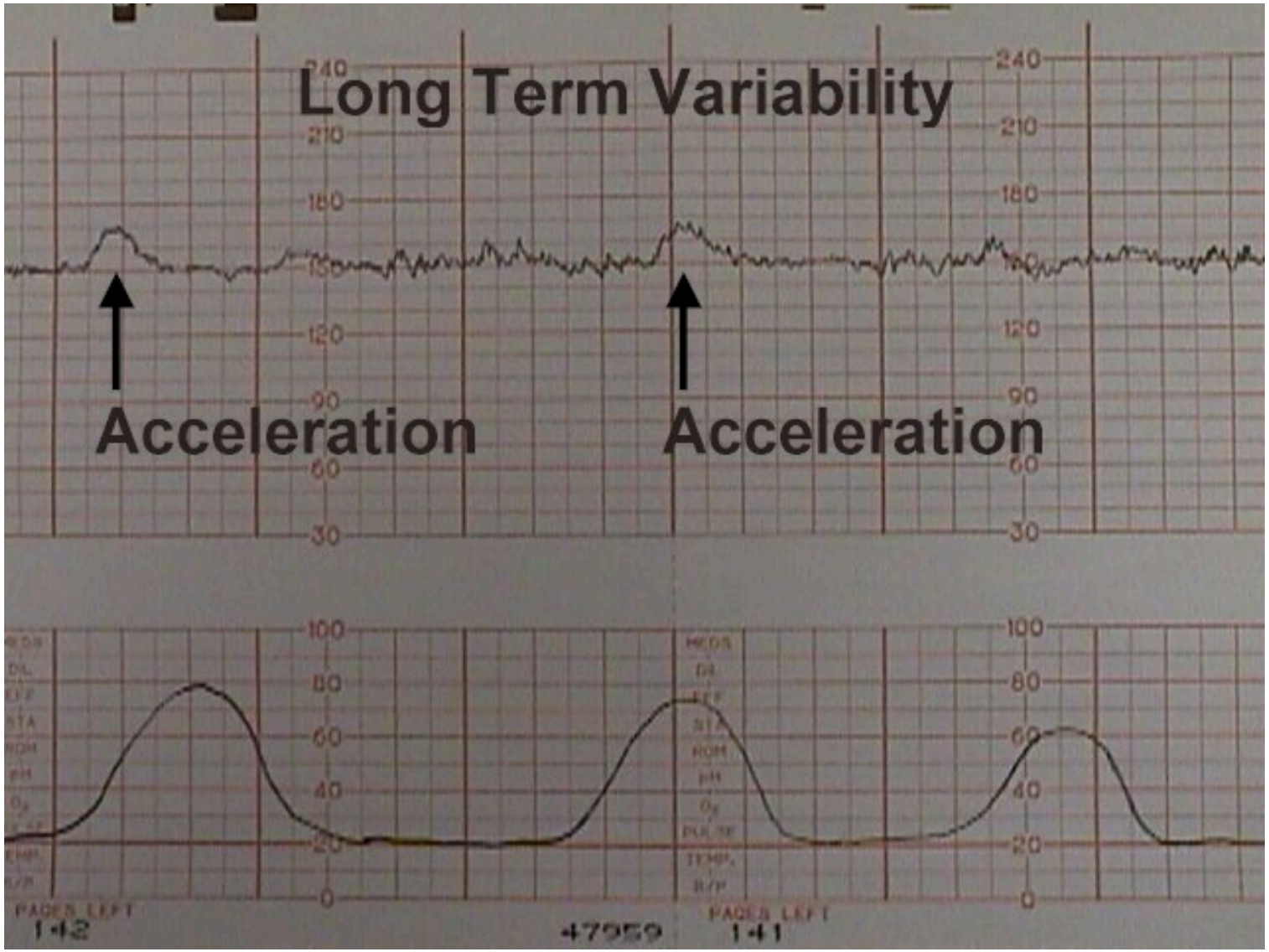
Baseline fetal heart rate and contractions



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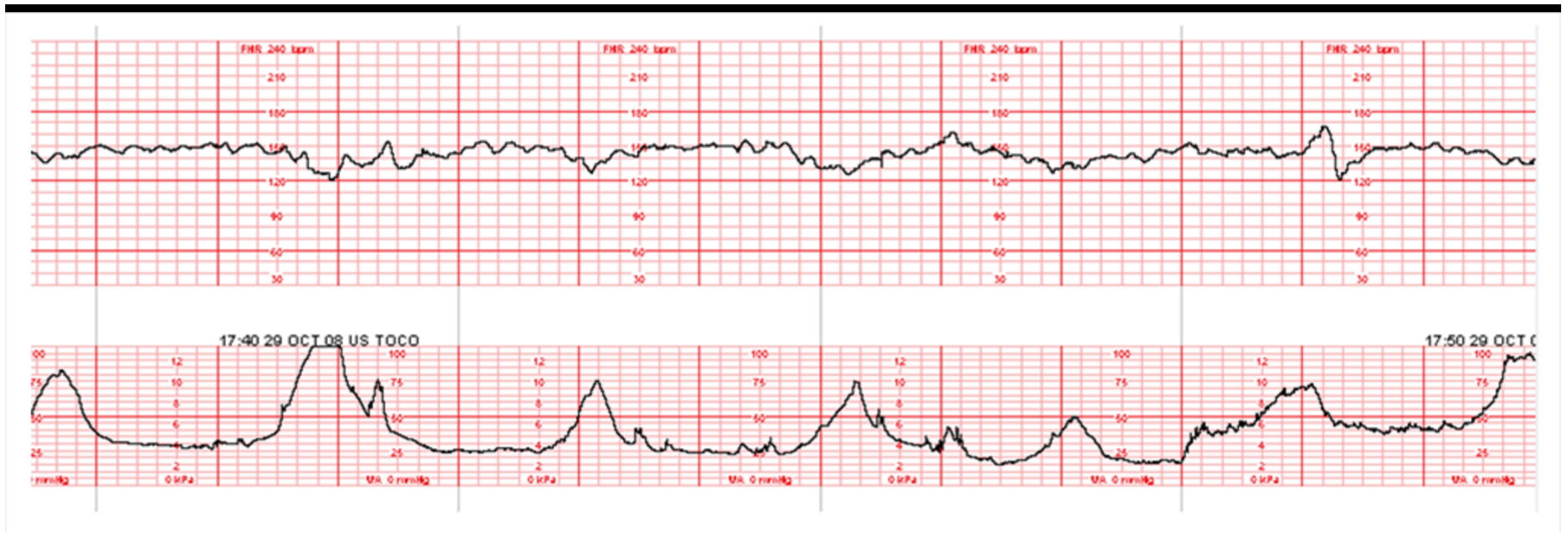
Baseline fetal heart rate and contractions



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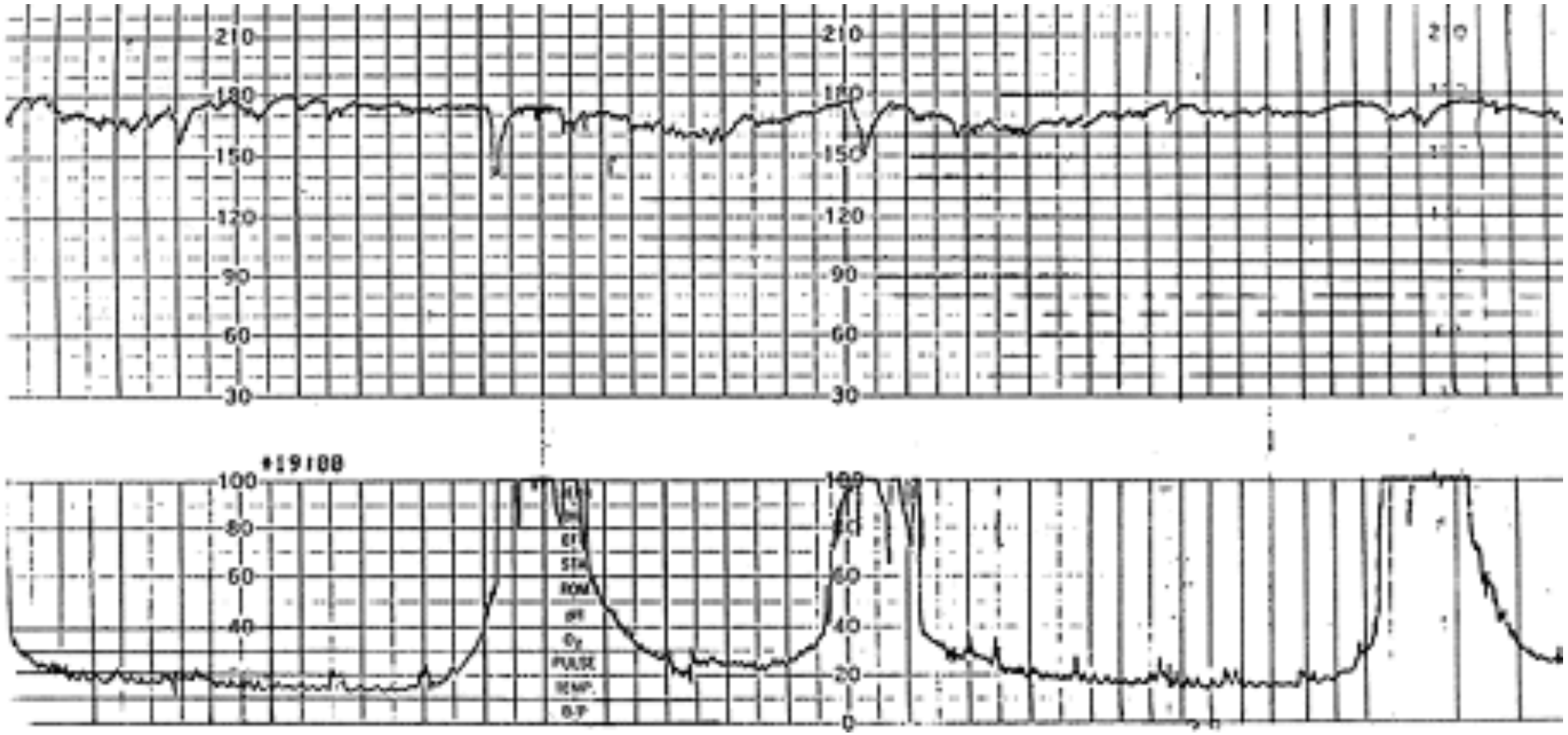
Baseline fetal heart rate and contractions



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Variability

- Visually quantitated as the amplitude of peak-to-trough in beats per minute

- Absent: amplitude range undetectable (“almost like a straight line”)
- Minimal: amplitude range detectable but 5bpm or fewer
- Moderate: amplitude range 6-25 bpm
- Marked: amplitude range greater than 25 bpm

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Variability

- Moderate baseline variability reflects the oxygenation of the central nervous system and reliably predicts the absence of damaging degrees of hypoxia-induced metabolic acidemia at the time it is observed

- Other conditions potentially associated with minimal or absent variability include a fetal sleep cycle, arrhythmia, medications, extreme prematurity, congenital anomalies, or preexisting neurologic injury.

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Variability

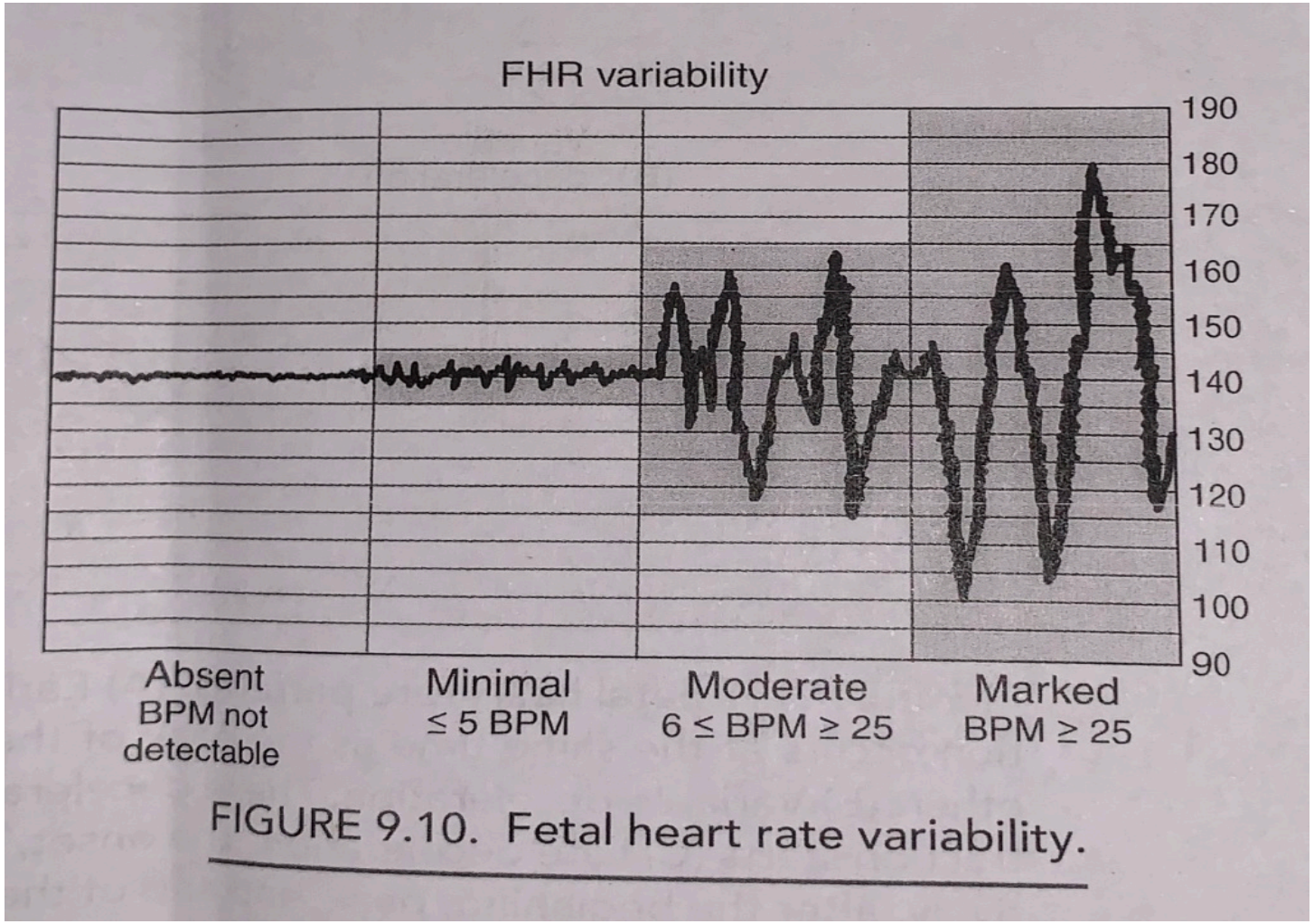

FIGURE 9.10. Fetal heart rate variability.

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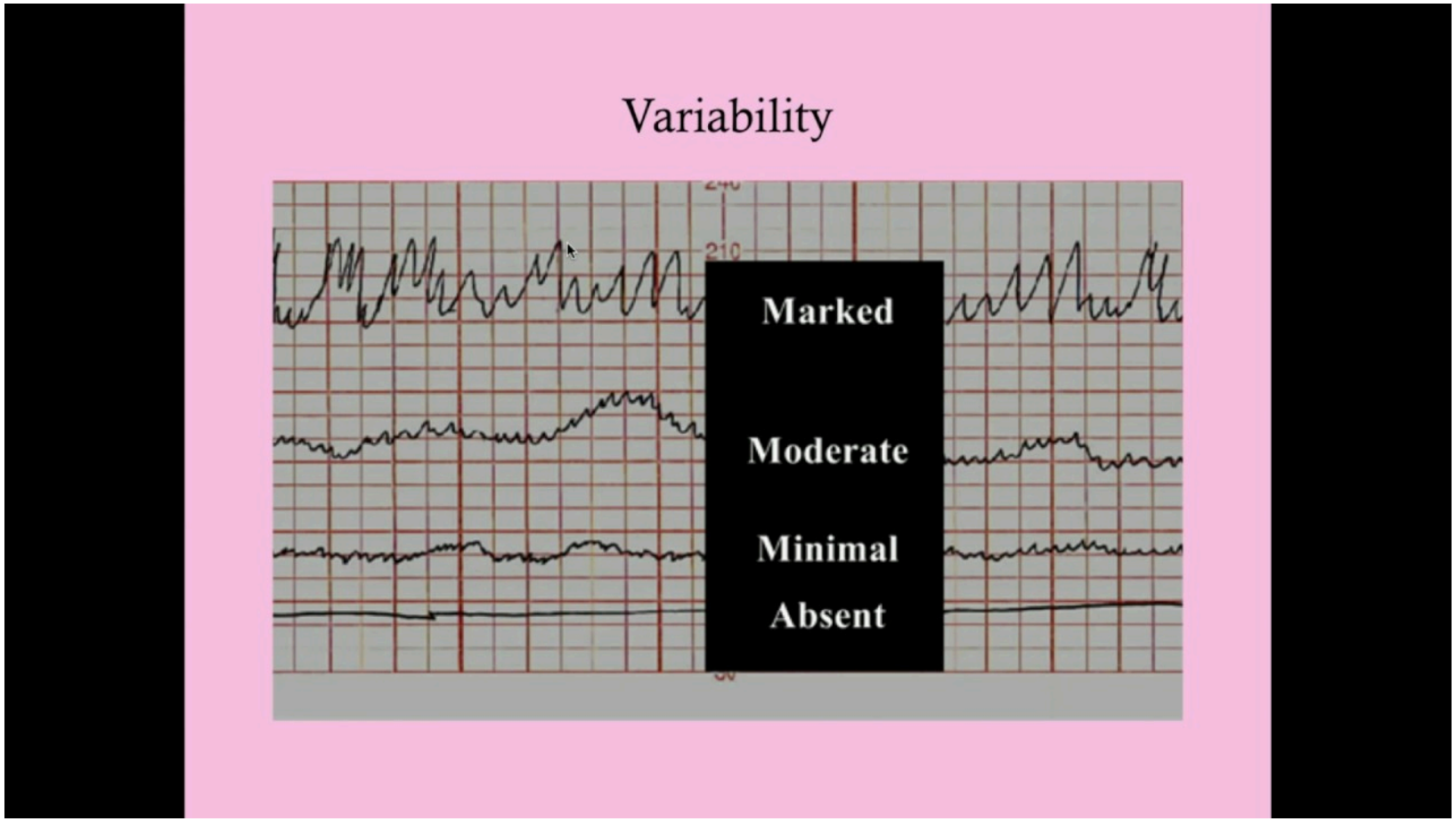
Variability



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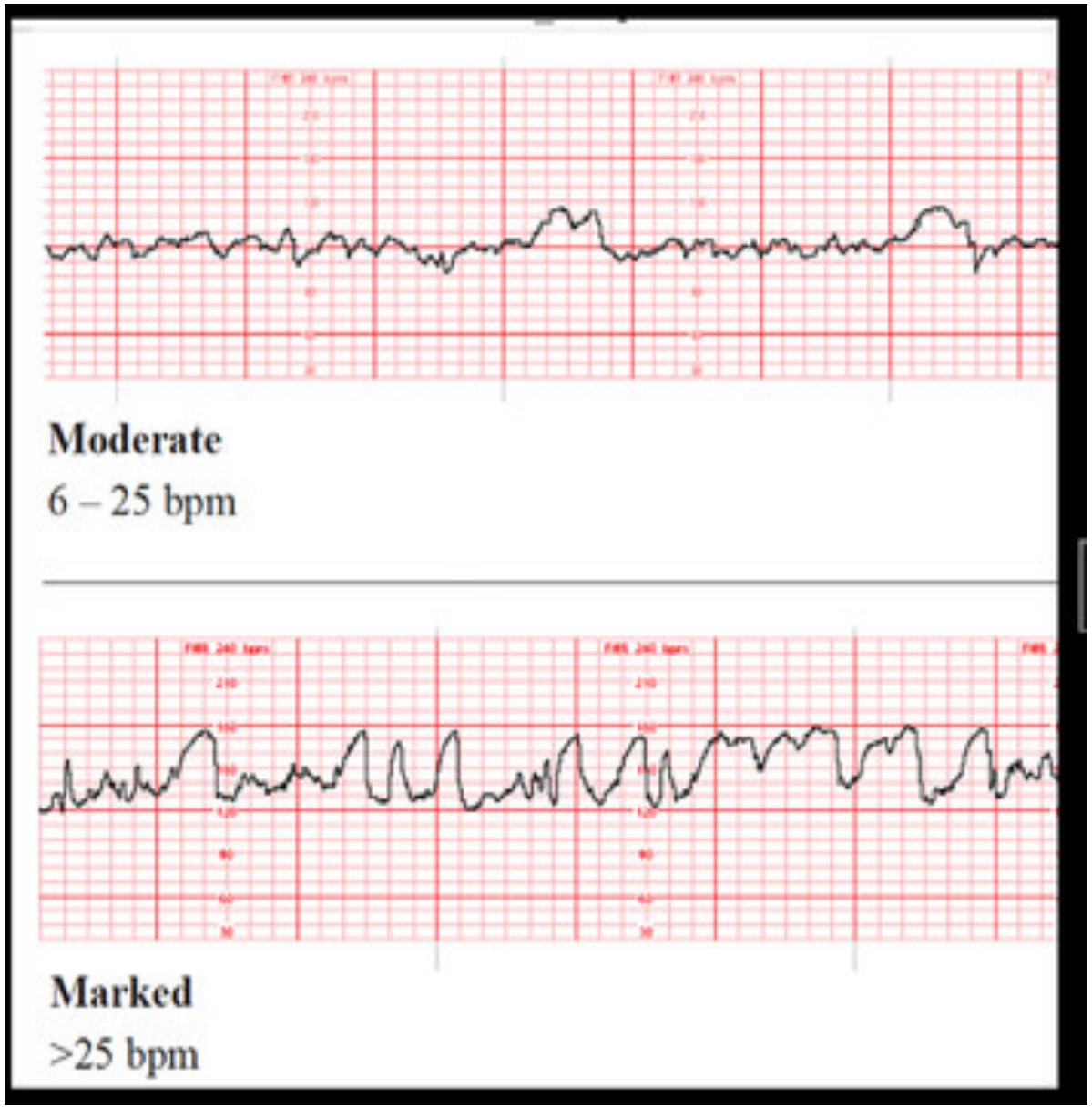
Variability



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Acceleration

- Visually apparent increase in the FHR from the baseline
- Duration of acceleration is from the onset of initial change in FHR from the baseline, to its return to baseline
- Starting at 32 weeks AOG, accelerations should have peak /acme of 15 bpm or more above baseline with duration of at least 15 seconds, but less than 2 min
- At < 32 weeks AOG, accelerations should have peak /acme of 10 bpm or more above baseline with duration of at least 10 seconds, but less than 2 min

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Acceleration

- FHR accelerations are frequently associated with fetal movement, possibly as a result of stimulation of peripheral proprioceptors, increased catecholamine release, and autonomic stimulation of the heart.
- As with moderate baseline variability, FHR accelerations reliably predict the absence of damaging degrees of fetal hypoxia and fetal metabolic acidemia at the time they are observed

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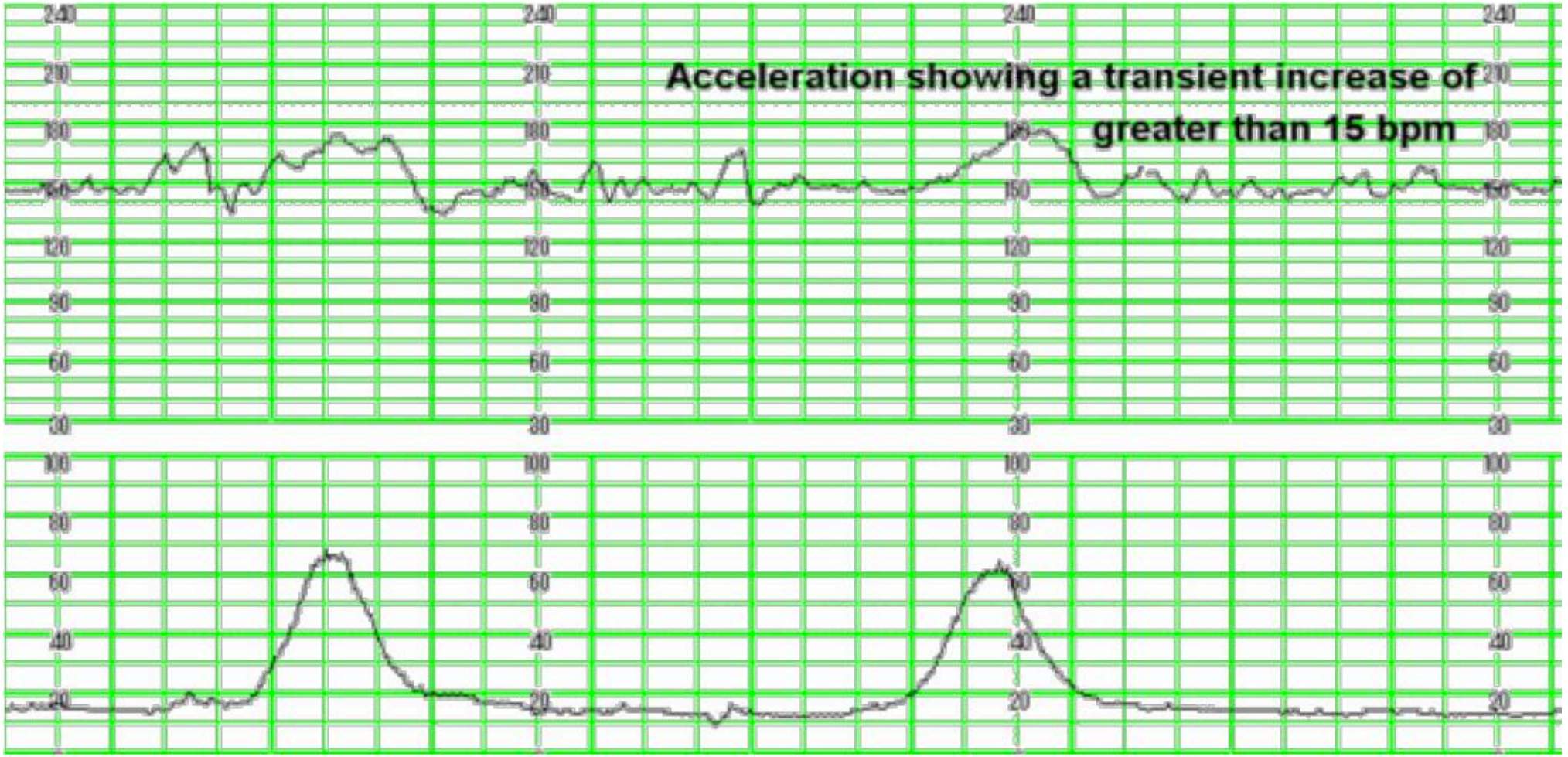
Acceleration



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Accelerations

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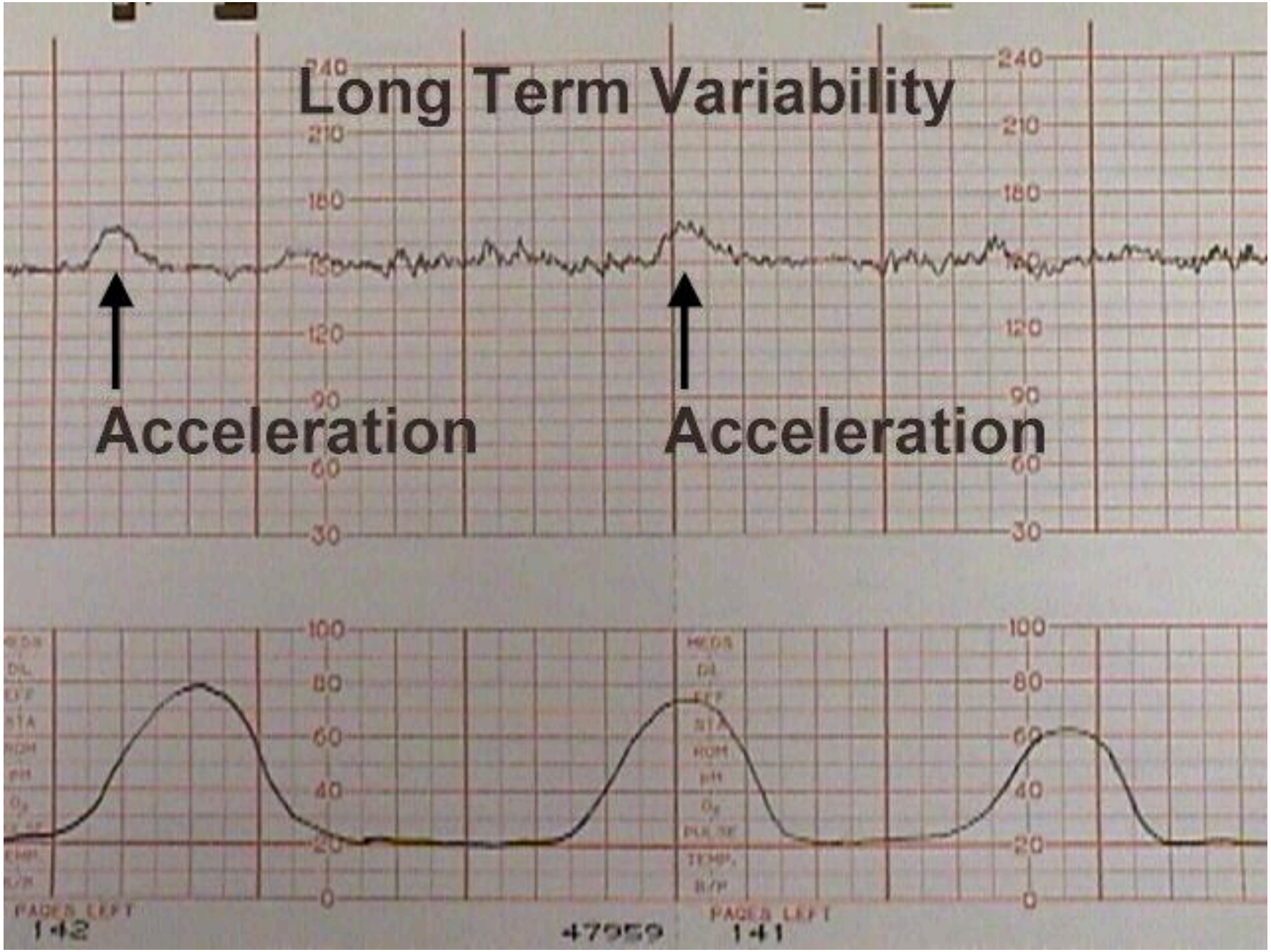

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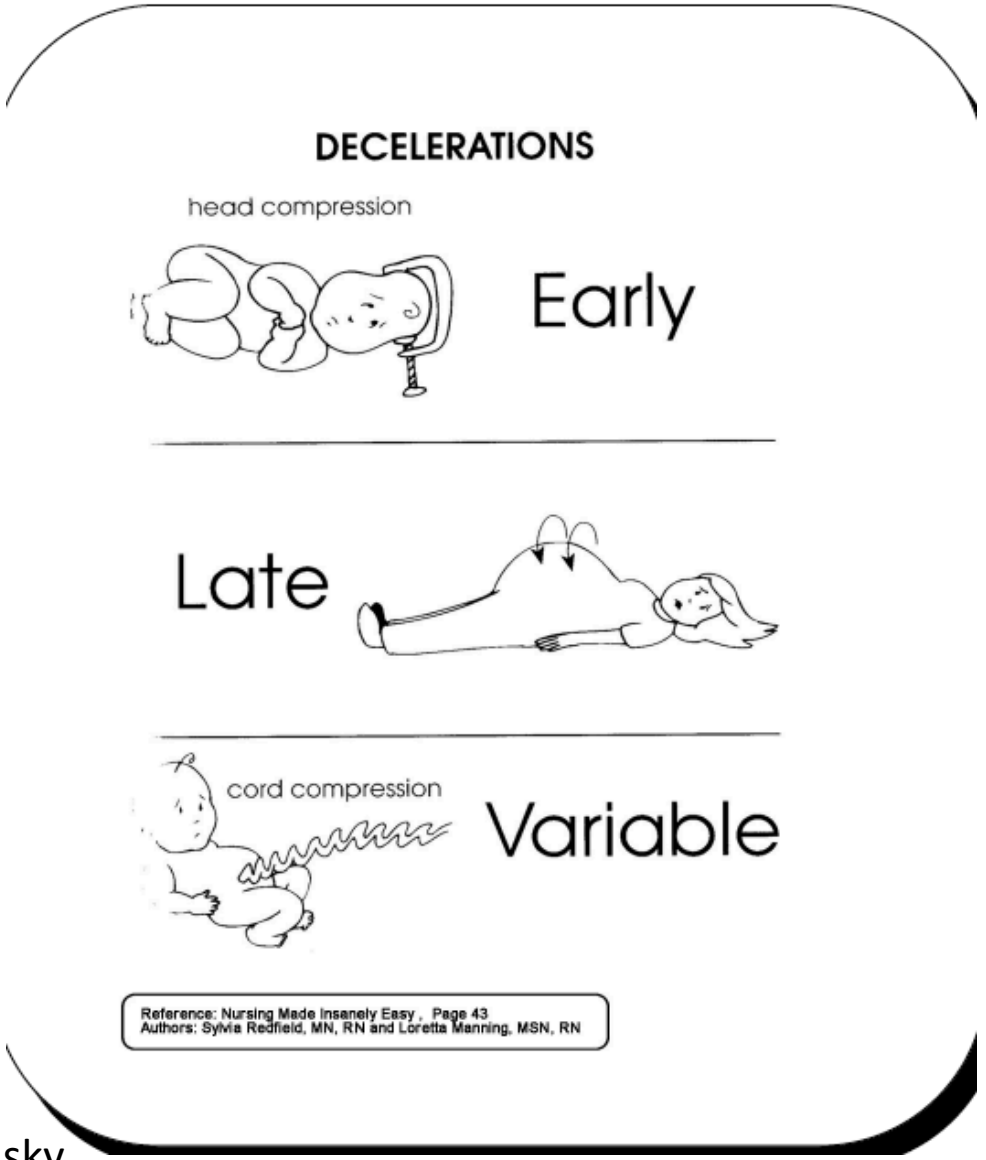
decelerations

- Visually apparent decrease in FHR from the baseline

- 3 patterns
- Early decelerations
- Late decelerations
- Variable decelerations



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Early deceleration

- likely represents an autonomic response to changes in intracranial pressure and/or cerebral blood flow caused by intrapartum compression of the fetal head during a uterine contraction and maternal expulsive efforts
- Early decelerations are clinically benign: They are not associated with an interruption of fetal oxygenation, metabolic acidemia, or hypoxic-ischemic neurologic injury.

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Late deceleration

- fetal response to transient hypoxemia during a uterine contraction
- Interruption of the oxygen pathway to the fetus can occur at multiple maternal levels in addition to uterine contractions, such as the lungs (eg, maternal hypoxemia), heart (eg, poor cardiac output) or vasculature (eg, hypotension).
- fetal oxygenation is interrupted sufficiently to result in both severe hypoxemia and metabolic acidemia and, in turn, direct myocardial depression and late decelerations

- After the contraction, fetal oxygenation is restored, autonomic reflexes subside, and the FHR gradually returns to baseline

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Late deceleration

- **Etiologies of Late Decelerations**
- Excessive uterine contractions, maternal hypotension, or maternal hypoxemia.
- Reduced placental exchange as in hypertensive disorders, diabetes, IUGR, abruption.

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Variable deceleration

- A variable deceleration reflects a fetal autonomic reflex response to transient mechanical compression of the umbilical cord
- Cord compression with or without other sources of interrupted fetal oxygenation may result in recurrent variable decelerations with absent/minimal variability and no accelerations.

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Prolonged deceleration

- A prolonged deceleration reflects a fall in FHR by ≥15 bpm, lasting ≥2 but <10 minutes
- It is caused by the same physiologic mechanisms responsible for late or variable decelerations, but interruption of fetal oxygenation occurs for a longer period of time.

- If the fall in FHR lasts ≥10 minutes, it is defined as a baseline change

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Sinusoidal pattern

- The sinusoidal pattern is a smooth, sine-wave like undulating pattern in FHR baseline with a cycle frequency of three to five cycles per minute that persists for at least 20 minutes.
- This pattern is characterized by fluctuations in the FHR baseline that are regular amplitude and frequency.
- The sinusoidal pattern is associated with severe fetal anemia, although the pathophysiologic mechanism has not been elucidated.

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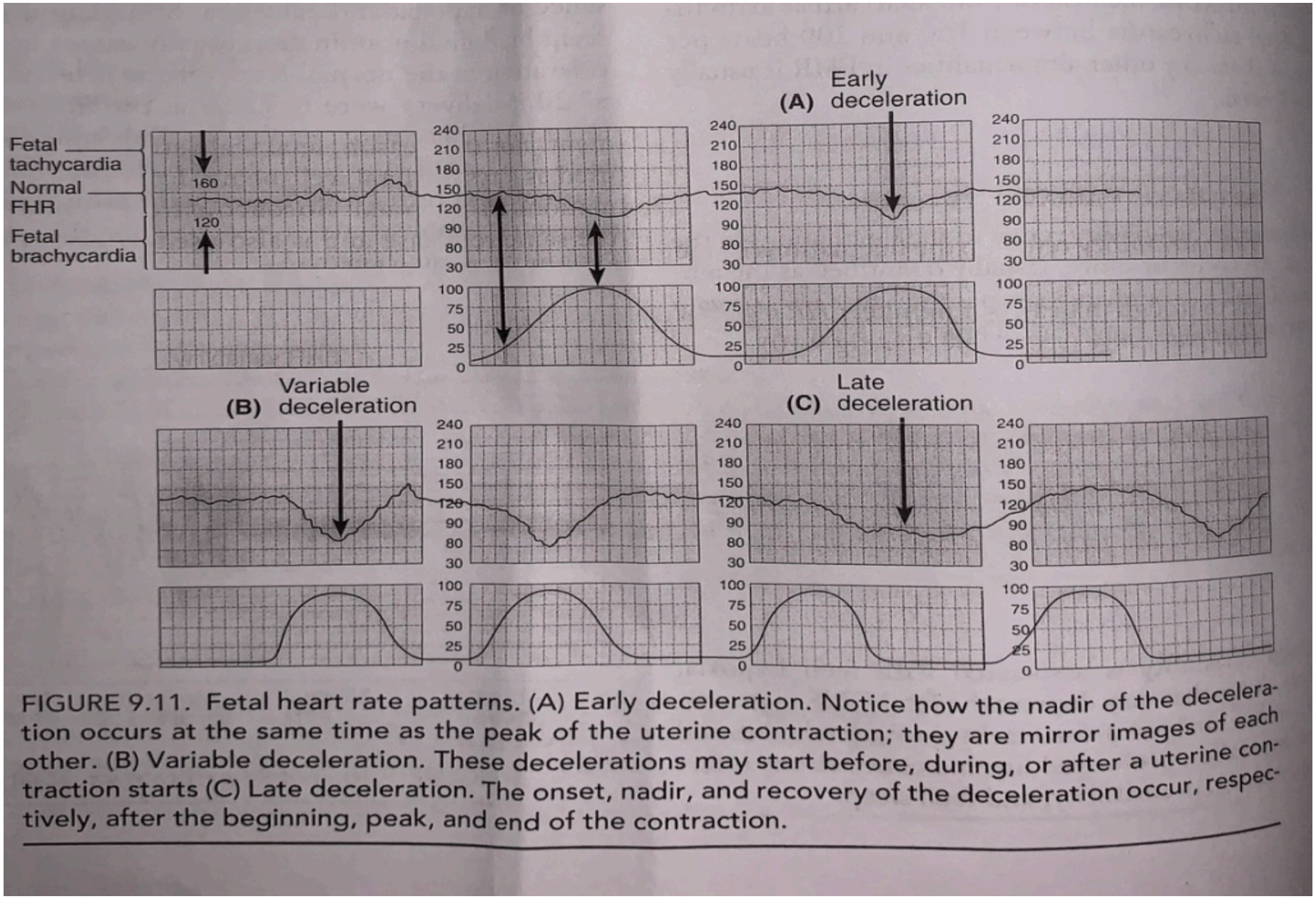

FIGURE 9.11. Fetal heart rate patterns. (A) Early deceleration. Notice how the nadir of the deceleration occurs at the same time as the peak of the uterine contraction; they are mirror images of each other. (B) Variable deceleration. These decelerations may start before, during, or after a uterine contraction starts (C) Late deceleration. The onset, nadir, and recovery of the deceleration occur, respectively, after the beginning, peak, and end of the contraction.

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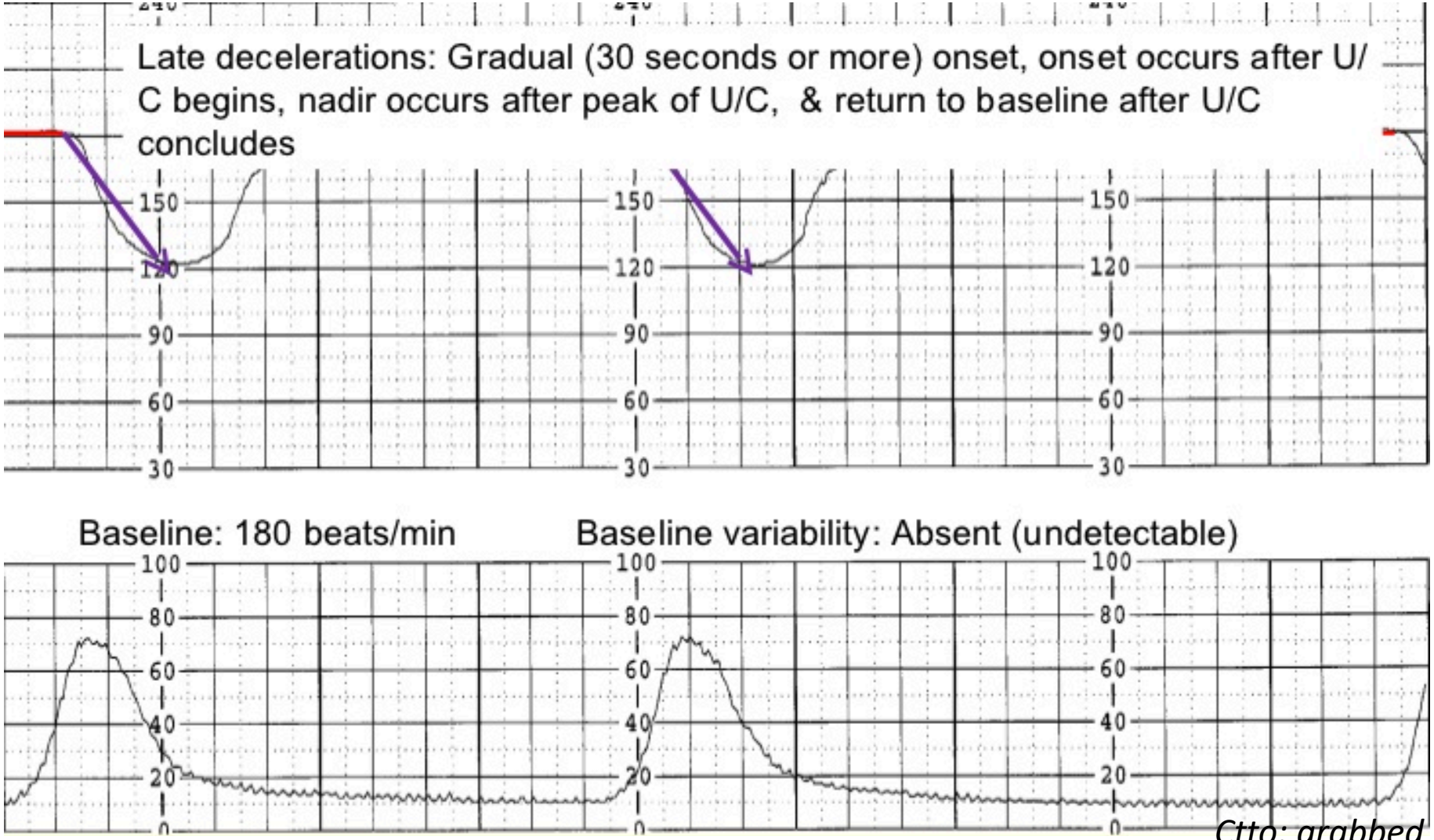
Late deceleration



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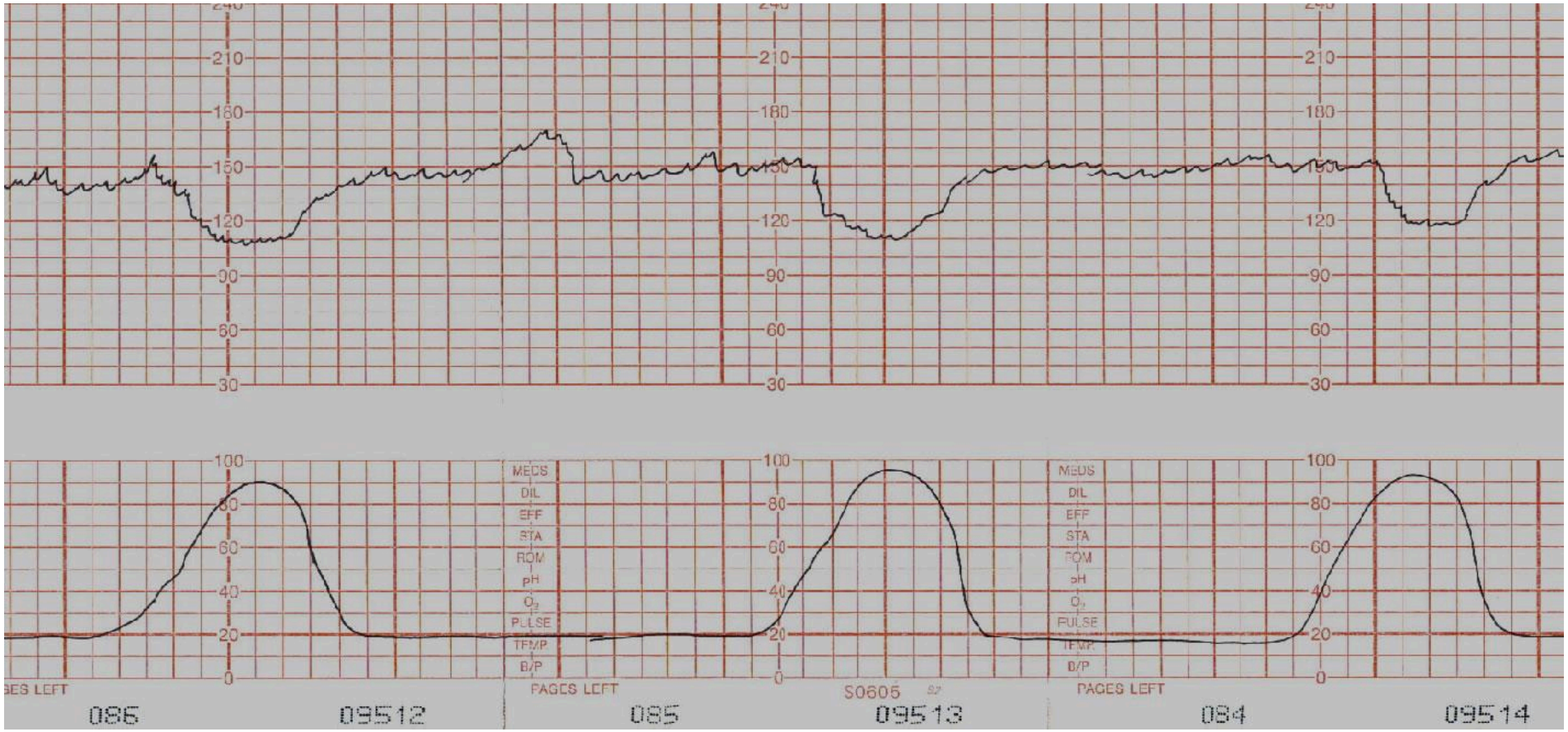
Early decelerations (usually is due to head compression)



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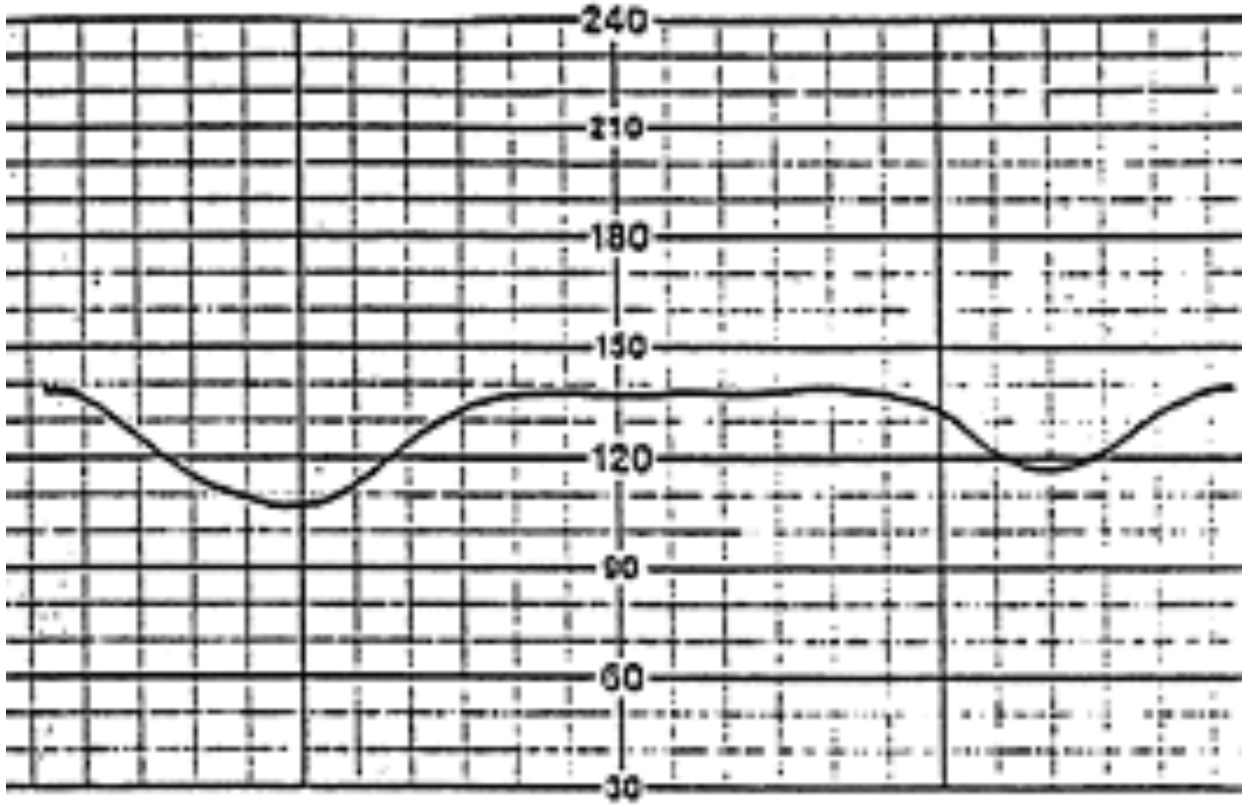
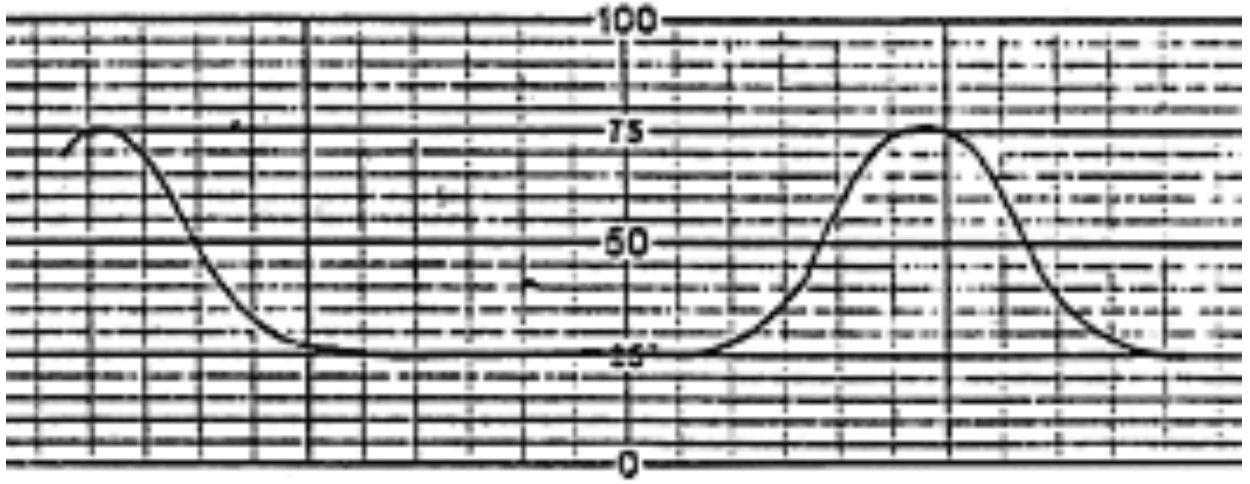
Late decelerations





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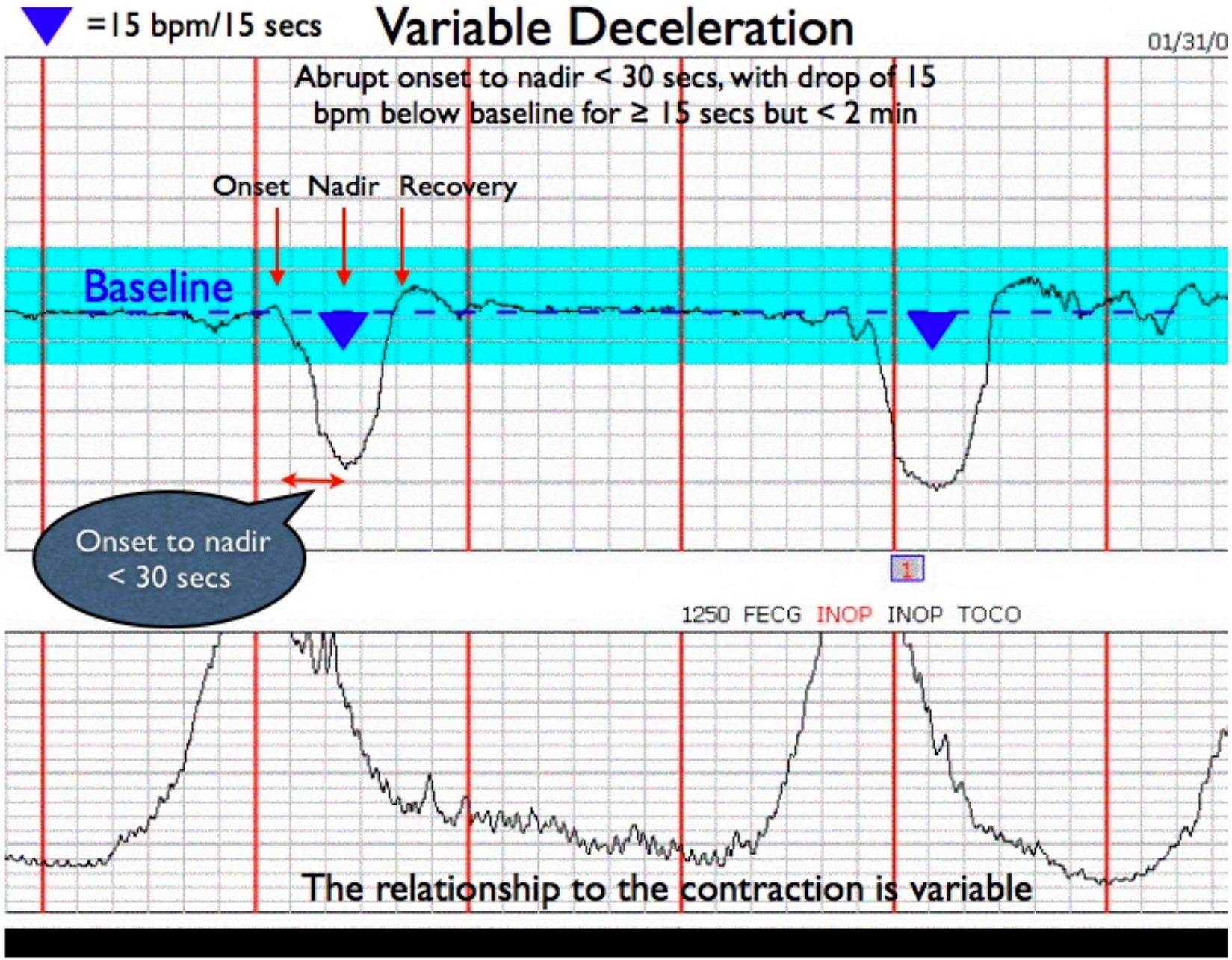

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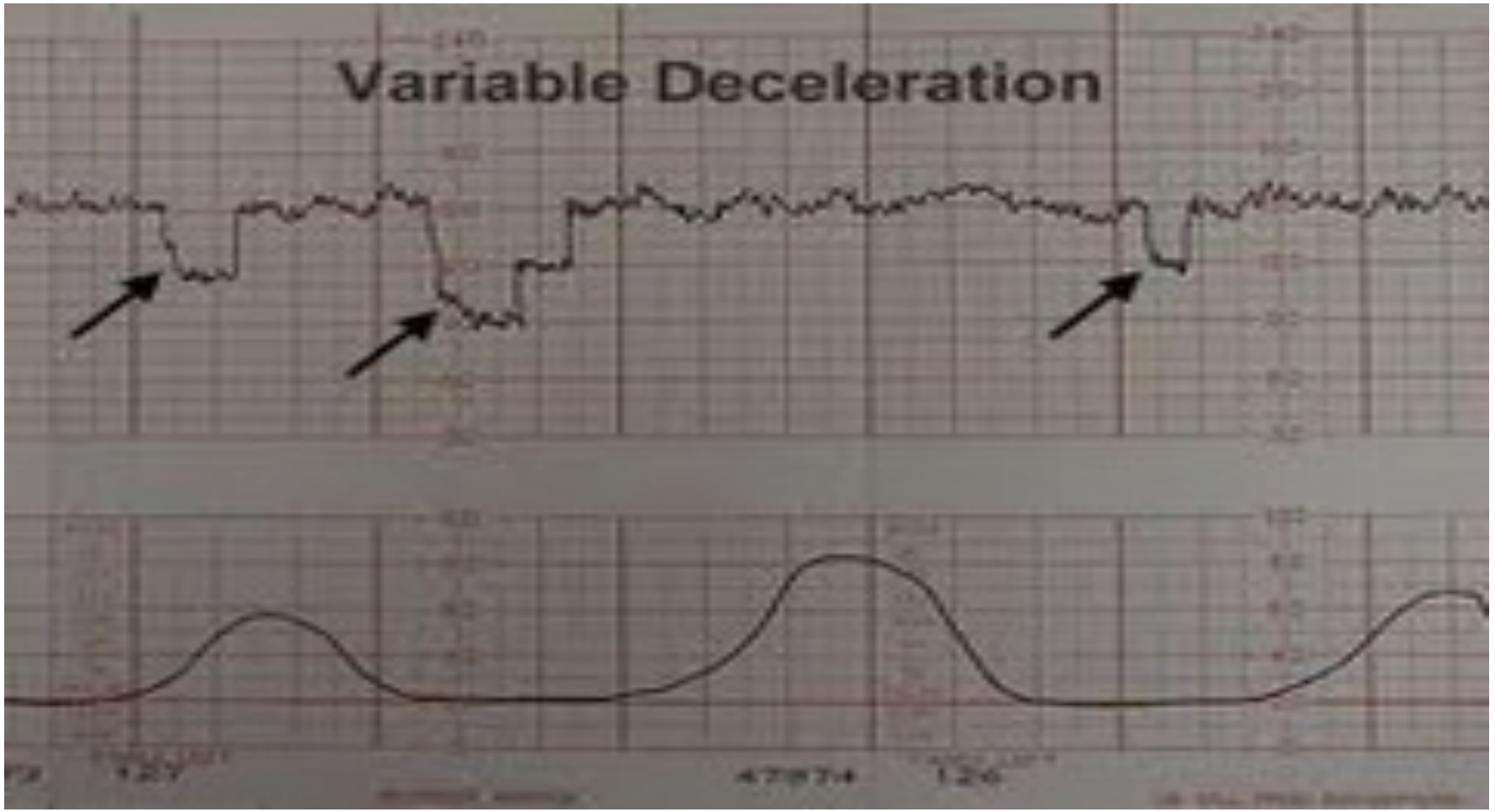
Variable deceleration



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Interpretation (Category I, II, III)

- **Category I FHR pattern**
  - A category I pattern is normal: it indicates minimal likelihood of significant metabolic acidemia and ongoing fetal hypoxic injury at that point in time. The fetal status and FHR pattern may remain stable over time, or the fetal status may change, resulting in a category II or category III pattern.
  - has **all** of the following components

1. A baseline FHR of 110 to 160 bpm
2. Moderate FHR variability (6 to 25 bpm)
3. Absence of late or variable FHR decelerations
4. Early decelerations may or may not be present
5. Accelerations may or may not be present

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Interpretation (Category I, II, III)

- **Category III FHR pattern**
  - A category III pattern is abnormal: it is associated with an increased likelihood of severe hypoxia and metabolic acidemia at that point in time.
  - A category III tracing has **at least one** of the following components

1. Absent variability with recurrent late decelerations
2. Absent variability with recurrent variable decelerations
3. Absent variability with bradycardia
4. A sinusoidal pattern

- Late decelerations and variable decelerations are considered recurrent when they occur with at least 50 percent of uterine contractions in a 20-minute window
- Prompt evaluation, expeditious use of conservative measures to improve fetal oxygenation, and/or expeditious delivery are indicated when a category III pattern is observed because fetal/neonatal morbidity or mortality may occur if the pattern persists.

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Interpretation (Category I, II, III)

- **Category II FHR pattern**
  - Category II FHR patterns include all FHR patterns that are not classified as category I (normal) or category III (abnormal)
  - Because category II tracings may remain stable for a prolonged period of time, have an uncertain prognosis, and are common (observed at some point in 84 percent of tracings, pregnancies with this pattern are the most difficult to evaluate and manage.

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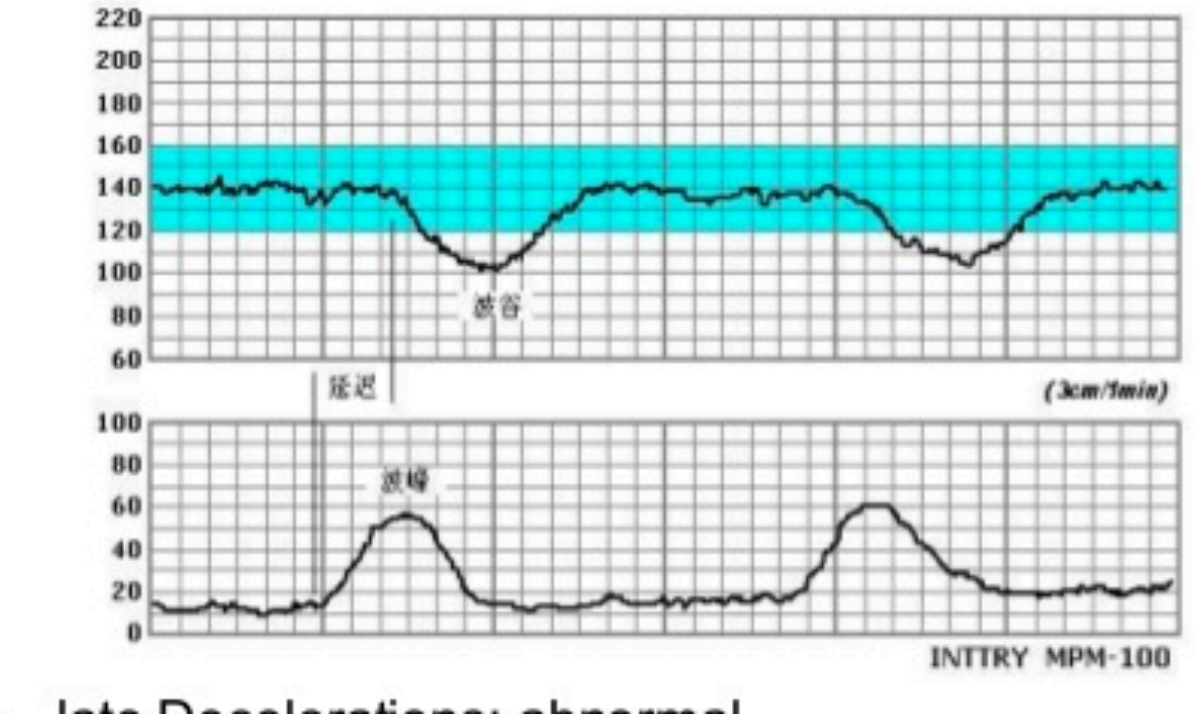
practice

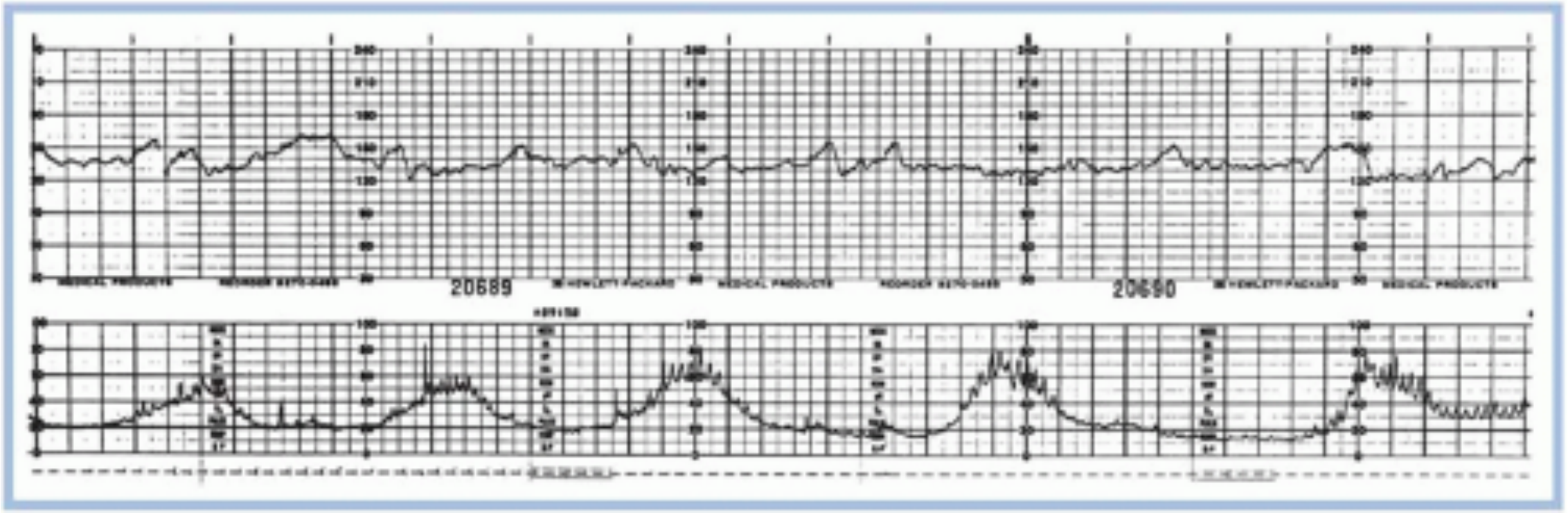
- Baseline FHR: 140-150
- Contractions q 2-3 min, moderate
- Minimal variability
- No accelerations
- (+) decelerations

- Interpretation:

Category 3



practice



- Baseline fetal heart rate: 130-140 bpm
- Contractions q2-3min, moderate
- Moderate variability
- (+) accelerations
- (-) decelerations
- Interpretation: category 1

Thank you!

youtube channel: Ina Irabon

www.wordpress.com: Doc Ina OB Gyne