National Certification Corporation

NICHD Definitions and Classifications: Application to Electronic Fetal Monitoring Interpretation

Purpose of this Monograph

Safe care for mothers and babies during labor and birth is the goal of all health care professionals and is an expectation of childbearing women and their families. Fetal assessment is a key aspect of perinatal patient safety. The Joint Commission Sentinel Event Alert, *Preventing Infant Death and Injury During Delivery*, issued on July 21, 2004, highlighted a need to develop clear guidelines for fetal monitoring of potential high-risk patients including protocols for the interpretation of fetal heart rate tracings and to educate nurses, resident physicians, nurse midwives and attending physicians to use standard terminology to communicate abnormal fetal heart rate tracings.[1] The need to develop processes to address this important safety issue resonated among the professional medical and nursing organizations and individual hospitals and health care systems. In recent publications from the American College of Obstetricians and Gynecologists (ACOG) and the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), use of the definitions for fetal heart rate patterns developed by the National Institute of Child Health and Human Development (NICHD)[2, 3, 4] was recommended and incorporated in educational activities.[5, 6, 7, 8]

In April 2008, the NICHD, in partnership with ACOG and the Society for Maternal-Fetal Medicine, convened a group of researchers and clinical experts to review the nomenclature, interpretation, and research recommendations for intrapartum electronic fetal heart rate monitoring that were originally developed by the NICHD in 1997.[2] The group recommended changes in classification of fetal heart rate patterns and added definitions for uterine activity.[3, 4]

A first step in standardizing electronic fetal monitoring terminology is to educate and to familiarize health care professionals with the NICHD definitions and classifications. This monograph is an effort to address some of these educational needs and to provide an update based on the proceedings of the 2008 NICHD workshop report on electronic fetal monitoring.[3, 4] The monograph summarizes the NICHD definitions and classifications as identified in the articles, "The 2008 National Institute of Child Health and Human Development Workshop Report on Electronic Fetal Monitoring" published in *Obstetrics and Gynecology*, Volume 112, Issue 3, 661-666[3] and in the *Journal of Obstetric, Gynecologic and Neonatal Nursing*, Volume 37, Issue 5, pages 510-515.[4]

The monograph also addresses related electronic fetal monitoring (EFM) interpretation issues and intrauterine resuscitation measures as outlined in the ACOG Practice Bulletin, *Intrapartum fetal heart rate monitoring: Nomenclature, interpretation, and general management principles*. Number 106, June 2009, pages, 192-202[6] and the text *AWHONN's Fetal heart monitoring* (4th ed.).[8] June 2009.

NCC encourages the reader to obtain the original documents for further review and study.

Why the NICHD Terminology Was Developed

In the mid 1990s a lack of consensus was identified in definitions and nomenclature related to fetal heart rate monitoring and the clinical interpretation of fetal heart rate patterns in the United States. Therefore, between May 1995 and November 1996, the NICHD sponsored a Research Planning Workshop to address this issue.

A group of investigators was convened to "propose a standardized and rigorously, unambiguously described set of definitions that can be quantitated… [and] to develop recommendations for the investigative interpretation of intrapartum fetal heart rate tracings so that the predictive value of monitoring could be assessed more meaningfully in appropriately designed observational studies and clinical trials."[2] p.1385.

Despite the publication in 1997 of the proceedings from the NICHD Research Planning Workshop[2], widespread adoption of the recommended terminology for fetal heart rate patterns did not occur in the United States until 2005, in part, to address the needs for standardization as outlined in the July 2004 Joint Commission Sentinel Event Alert, *Preventing Infant Death and Injury During Delivery*[1]. In May 2005, ACOG's Practice Bulletin, *Intrapartum Fetal Heart Rate Monitoring* with updated terminology based on the NICHD 1997 terminology was published.[5] Likewise, in the same month, AWHONN revised their *Fetal Heart Monitoring Program* to provide education consistent with the NICHD (1997) terminology.[7]

Meanwhile in 2001, the Royal College of Obstetricians and Gynaecologists (RCOG) in the United Kingdom produced a consensus document with more specific recommendations for fetal heart rate pattern classification and intrapartum management actions: *The use of electronic fetal monitoring: the use and interpretation of cardiotocography in intrapartum fetal surveillance, Evidence-based clinical guideline* Number 8.[9] In 2007, the Society of Obstetricians and Gynaecologists of Canada (SOGC) followed with similar document: *Fetal health surveillance: antepartum and intrapartum consensus guideline.*[10]

In the United States, there was growing concern that the existing two-tiered system for classification of fetal heart rate patterns (reassuring and nonreassuring) was inadequate and did not accurately reflect the physiologic implications of various fetal heart rate patterns obtained via electronic fetal monitoring. As did RCOG in 2001 and SOGC in 2007, members of the 2008 NICHD workshop on EFM recommended adoption of a three-tiered classification system for interpretation of fetal heart rate patterns.[3, 4]

Operational Principles on Using NICHD Terminology

Operational principles for the basis of defining terms and their interpretive value in assessing fetal heart rate tracings were standardized in 1997 and reaffirmed in 2008. The most pertinent are listed below

- Definitions are to be used for visual interpretation.
- Definitions would apply to patterns obtained from a direct fetal electrode or an external Doppler device.
- The focus would be on intrapartum patterns, but the definitions would be applicable to antepartum observations as well.
- Fetal heart rate patterns are defined as baseline, periodic or episodic. Periodic patterns are those that are associated with contractions and episodic patterns are not associated with uterine contractions.
- Fetal heart rate patterns and uterine activity would be determined through interpretation of tracings of good quality.
- The components of fetal heart rate tracings do not occur in isolation and evaluation of fetal heart rate patterns should take into account all components of fetal heart rate pattern, including baseline rate, variability and presence of accelerations or decelerations.
- Fetal heart rate tracings should be assessed over time to identify changes and trends.
- Accelerations and decelerations are determined based on the adjacent baseline fetal heart rate.
- Periodic patterns are identified based on the type waveform defined as abrupt vs. gradual onset of the deceleration.
- No differentiation between short and long term variability was made because in practice, they are visually determined as a unit.
- EFM patterns are dependent on gestational age so this is an essential interpretative factor for evaluating an EFM pattern. Maternal medical status, prior fetal assessment results, use of medications and other factors also may need to be considered.
- A complete description of the EFM tracing includes uterine contractions, baseline fetal heart rate, baseline variability, presence of accelerations, periodic or episodic decelerations, and changes or trends of the fetal heart rate pattern over time.[4, 5]

Terminology and Definitions[3, 4]

FETAL HEART RATE BASELINE

The mean fetal heart rate is rounded to increments of 5 beats per minute during a 10 minute segment excluding accelerations and decelerations, periods of marked variability, or baseline segments that differ by more than 25 beats per minute.

In any given 10 minute window, the minimum baseline duration must be at least 2 minutes (not necessarily contiguous). Otherwise, it is considered indeterminate. In these instances, review of the previous 10 minute segments should be the basis on which to determine the baseline.

In determining the baseline rate, a minimum of a 10 minute period of monitoring is necessary for confirmation of the rate.

The fetal baseline rate is classified as follows:

Normal:	110 to 160 beats per minute
Bradycardia:	Less than 110 beats per minute
Tachycardia:	Over 160 beats per minute

FETAL HEART RATE PATTERNS

Determination of baseline fetal heart rate variability is based on visual assessment and excludes sinusoidal patterns.

Variability is defined as fluctuations in the fetal heart rate baseline that are irregular in amplitude and frequency.

The visual quantification of the amplitude from peak to trough in beats per minute is as follows:

Amplitude Range	**Classification**
Undetectable	Absent
Undetectable to equal to or less than 5 beats per minute	Minimal
6 to 25 beats per minute	Moderate
More than 25 beats per minutes	Marked

A sinusoidal fetal heart rate pattern is a specific fetal heart rate pattern and described as a smooth, sine wave-like undulating pattern with a cycle frequency of 3 to 5 beats per minute that continues for at least 20 minutes or more.

ACCELERATIONS

Based on visual assessment, an acceleration is defined as an abrupt increase of at least 15 beats per minute in fetal heart rate above the baseline. Onset to peak is less than 30 seconds and duration is equal to or more than 15 seconds and less than two minutes from onset to return to baseline.

In pregnancies less than 32 weeks gestation, accelerations are defined as an increase of 10 beats per minute or more above baseline which lasts 10 seconds or more.

An acceleration is classified as prolonged if the duration is 2 minutes or more but less than 10 minutes. Accelerations that are 10 minutes or more are considered a baseline change.

LATE DECELERATIONS

Based on visual assessment, a late deceleration is defined as a usually symmetrical, gradual decrease in fetal heart rate and return to baseline associated with uterine contractions. Onset to nadir is equal to or greater than 30 seconds. The nadir of the deceleration usually occurs after the peak of the contraction.

EARLY DECELERATIONS

Based on visual assessment, an early deceleration is defined as a usually symmetrical, gradual decrease in fetal heart rate and return to baseline associated with uterine contractions. Onset to nadir is equal to or greater than 30 seconds. The nadir of the deceleration usually occurs at the same time of the peak of the contraction.

VARIABLE DECELERATIONS

Based on visual assessment, a variable deceleration is defined as an abrupt decrease in fetal heart rate below the baseline which may or may not be associated with uterine contractions. Onset to beginning of nadir is less than 30 seconds. The decrease in fetal heart rate below the baseline is equal to or more than 15 beats per minute, lasting 15 seconds or more, but less than 2 minutes in duration from onset to return to baseline. When variable decelerations occur in conjunction with uterine contractions, the onset, depth and duration vary with each succeeding uterine contraction.

PROLONGED DECELERATION

Based on visual assessment, a prolonged deceleration is defined as a decrease in fetal heart rate below the baseline. The decrease in the fetal heart rate is 15 beats per minute or more and lasts for at least 2 minutes but less than 10 minutes from onset to return to baseline. A prolonged deceleration that is sustained for 10 minutes or more is a baseline change.

(See Appendix A for sample EFM tracings with each of these fetal heart rate characteristics)

Quantification of the Visual Interpretation of the Fetal Heart Rate

The quantification of bradycardia and tachycardia are based on the actual fetal heart rate in beats per minute. If the fetal heart rate is not stable, it can be determined by the visual range of the fetal heart rate.

The quantification of a deceleration is made by the depth of nadir in beats per minute below the baseline and excludes transient spikes or electronic artifact.

The duration of decelerations is quantified in minutes and seconds from the beginning to end of the deceleration. The same principles apply to accelerations as well.

Decelerations are identified as intermittent if they occur with less than 50% of contractions in any 20 minute segment.

Decelerations are identified as recurrent if they occur with 50% or more of uterine contractions in any 20 minute segment.

Uterine Activity

Uterine activity is assessed based on the number of contractions that are occurring in a 10 minute segment, averaged over a 30 minute period.

Normal uterine activity is described as 5 or less contractions in a 10 minute segment, averaged over a 30 minute period.

Excessive uterine activity is termed **tachysystole** and is described as more than 5 contractions in a 10 minute segment averaged over a 30 minute period.

Tachysystole can be the result of both spontaneous and stimulated labor.

(See Appendix B for sample EFM tracings with normal uterine activity and tachysystole)

Clinical Considerations[3, 4, 6, 8]

The primary purpose for the use of electronic fetal monitoring is to determine if the fetus is well oxygenated. Guidelines for review of electronic monitor tracings during the intrapartum period are based on the stage of labor and the status of the pregnancy. These guidelines are identified below[11]:

	First Stage of Labor	Second Stage of Labor
Pregnancy Without Complications	30 minutes	15 minutes
Pregnancy With Complications	15 minutes	5 minutes

Women who are receiving oxytocic agents for labor induction or augmentation should be monitored based on the criteria delineated for those with pregnancy complications.[10]

The physiologic conditions during passive fetal descent (delayed pushing; laboring down) are the same as during late first stage labor, therefore it is reasonable to apply assessment frequencies during first stage labor based on risk status to the period of passive fetal descent and initiate more frequent assessment during the active pushing phase of second stage labor.[12]

Fetal Heart Rate Pattern Interpretation

Fetal heart rate patterns provide information regarding fetal acid-base status at the time they are observed.[3,4] Because the fetal condition is dynamic, frequent reassessment is required to monitor ongoing fetal status considering the context of the complete clinical situation. A **three-tiered classification system** was developed based on fetal acid-base status at time of observation with the assumption that the fetal tracing changes over time.[3, 4] Fetal status can move from one category to another based on the individual clinical situation, maternal status and various intrauterine resuscitation measures that may be initiated in response to the fetal heart rate pattern.[3, 4]

Moderate variability and the presence of accelerations are two features of fetal heart rate patterns that reliably predict the absence of fetal metabolic acidemia at the time observed.[3, 4] However, it is important to note that the absence of accelerations or an observation of minimal or absent variability alone do not reliably predict the presence of fetal hypoxemia or metabolic acidemia.[3, 4]

FETAL HEART RATE PATTERN CLASSIFICATION AND INTERPRETATION

Category	Interpretation	Features
I Normal	Tracings in this category are strongly predictive of normal acid-base status at the time of observation.	• Baseline rate 110 to 160 beats per minute • Baseline variability moderate • Late or variable decelerations absent • Early decelerations present or absent
II Indeterminate	Tracings in this category are not predictive of abnormal acid-base status, however there are insufficient data to classify them as either category I or category III.	All tracings not categorized as category I or III and may represent many tracings that are encountered in everyday clinical practice. Examples: • Minimal variability • Absent variability without recurrent decelerations • Marked variability • Absence of induced accelerations after fetal stimulation • Recurrent variable decelerations with minimal or moderate variability • Prolonged deceleration • Recurrent late decelerations with moderate variability • Variable decelerations with "slow return to baseline", "overshoots" or "shoulders"
III Abnormal	Tracings in this category are predictive of abnormal acid-base status at the time of observation.	• Absent variability *and* any of the following: - Recurrent late decelerations - Recurrent variable decelerations - Bradycardia • Sinusoidal pattern

Derived from: Macones, G. A., Hankins, G. D. V., Spong, C. Y., Hauth, J., & Moore, T. (2008). The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring. *Obstetrics and Gynecology*, 112(3), 661-666.; *Journal of Obstetric, Gynecologic and Neonatal Nursing*, 37(5), 510-515.

(See Appendix C for sample EFM tracings in each of the categories)

Evaluation and Treatment Based on Category

Indeterminate (category II) and abnormal (category III) tracings require evaluation of the possible etiology.[6] Initial assessment and intervention may include discontinuation of any labor stimulating agent, a vaginal examination, maternal repositioning, correction of maternal hypotension, an intravenous fluid bolus of lactated Ringer's solution, assessment for tachysystole (and if noted, reduction in uterine activity), amnioinfusion, and modification of maternal pushing efforts in second stage labor (e.g. pushing with every other or every third contraction or discontinuation of pushing temporarily).[6, 13] Maternal oxygen at 10 liters per nonrebreather face mask may be administered in the presence of minimal or absent variability or recurrent late decelerations that have not resolved with the initial intrauterine resuscitative measures.[13]

INTRAUTERINE RESUSCITATION MEASURES

Clinical Situation and/or FHR Characteristics	Goal	Techniques/Measures
Minimal or absent variability Recurrent late decelerations Recurrent variable decelerations Prolonged decelerations Tachycardia Bradycardia Variable, late or prolonged decelerations occurring with maternal pushing efforts	Promote fetal oxygenation	Lateral positioning (either left or right) IV fluid bolus of lactated Ringer's solution Oxygen administration at 10 L/min via nonrebreather facemask; may be considered if there is minimal to absent variability and/or recurrent late decelerations or prolonged decelerations (discontinue as soon as possible based on fetal status) Modification of pushing efforts; pushing with every other or every third contraction or discontinuation of pushing temporarily (during second stage labor) Decrease in oxytocin rate Discontinuation of oxytocin / removal of Cervidil insert / withholding next dose of misoprostol
Tachysystole	Reduce uterine activity	IV fluid bolus of lactated Ringer's solution Lateral positioning (either left or right) Decrease in oxytocin rate Discontinuation of oxytocin / removal of Cervidil insert / withholding next dose of misoprostol If no response, terbutaline 0.25 mg subcutaneously may be considered
Recurrent variable decelerations	Alleviate umbilical cord compression	Repositioning Amnioinfusion (during first stage labor) Modification of pushing efforts; pushing with every other or every third contraction or discontinuation of pushing temporarily (during second stage labor)
Maternal hypotension	Correct maternal hypotension	Lateral positioning (either left or right) IV fluid bolus of lactated Ringer's solution If no response, ephedrine 5 mg to 10 mg IV push may be considered

Derived from: Simpson, K. R. (2009). Physiologic interventions for fetal heart rate patterns. In A. Lyndon & Ali, L. U. (Eds.) *AWHONN's Fetal heart monitoring.* 4th ed.: Washington, DC: Kendall Hunt, page 139.[13]

Communication of Electronic Fetal Monitoring Data

When the fetal heart rate pattern is indeterminate (category II) or abnormal (category III), communication amongst members of the perinatal team is essential in ensuring appropriate and timely response to the clinical situation. Standardizing components of the data communicated can be useful in promoting patient safety. The following are suggested aspects of professional communication regarding fetal status when the fetal heart rate pattern is indeterminate or abnormal:

- Baseline rate, variability, presence or absence of accelerations and decelerations
- Clinical context of fetal heart rate pattern (e.g. oxytocin rate and recent titration, timing and amount of last dose of misoprostol, uterine activity, tachysystole, bleeding, timing and amount of last dose of intravenous pain meds, recent initiation or dosage change in regional anesthesia/analgesia, hypotension, rapid labor progress, second stage labor pushing, umbilical cord prolapse; trial of labor attempting vaginal birth after cesarean birth)
- Intrauterine resuscitation measures initiated and the maternal-fetal response
- Fetal heart rate pattern evolution (e.g. how long has this been evolving?)
- Sense of urgency for bedside evaluation (e.g. now; as soon as you can; within 30 min)
- Who was notified and their response
- Next steps if there is no resolution of the fetal heart rate pattern

Factors Affecting Fetal Heart Rate Patterns

There are many factors that have an effect on the fetal heart rate. These changes can relate to pre-existing or pregnancy-related conditions, substances used by the woman before labor, medications given to the woman in labor, and other influences such as maternal positioning, excessive uterine activity and maternal pushing efforts. The changes may be transient and benign or require monitoring and/or intervention/s. In the following two charts, medications and common factors are identified along with the associated fetal heart rate change. As there are multiple challenges in conducting research related to the effects of various extrinsic and intrinsic factors on the fetus, the supportive evidence is mainly level II-3 (evidence obtained from multiple time series with or without the intervention) or III (opinions of respected experts based on clinical experience, descriptive studies, or reports of expert committees).

THE INFLUENCE OF MEDICATIONS ON FETAL HEART RATE[6]

Medication	Change in Fetal Heartrate
Narcotics	Decrease in variability, decrease in frequency of accelerations
Butorphanol	Transient sinusoidal fetal heart rate pattern, slight increase in baseline rate
Cocaine	Decrease in FHR variability
Corticosteriods	Decrease in FHR variability with betamethasone, but not dexamethasone
Magnesium sulfate	Decrease in FHR variability, clinically insignificant decrease in baseline rate; inhibition of increasing accelerations as gestational age advances
Terbutaline	Increase in baseline rate
Zidovidine	No change

Derived from: American College of Obstetricians and Gynecologists (2009). *Intrapartum fetal heart rate monitoring: Nomenclature, interpretation, and general management principles*. (ACOG Practice Bulletin No. 106). Washington, DC: Author.[6] page 7.

FACTORS WITH VARYING DEGREES OF INFLUENCE ON THE FETAL HEART RATE[14]

Factor	Associated Rates and Patterns
Prematurity	Increase in baseline rate, decrease in variability, reduced frequency and amplitude of accelerations
Sleep cycle	Decrease in variability, reduced frequency and amplitude of accelerations
Spontaneous fetal movement	Accelerations
Scalp or vibroacoustic stimulation	Accelerations
Vaginal examination	Accelerations
Maternal fever	Increase in baseline rate, decrease in variability
Intraamniotic infection; chorioamnionitis	Increase in baseline rate, decrease in variability
Maternal hyperthyroidism	Tachycardia, decrease in variability
Maternal hypothermia	Bradycardia
Maternal hypoglycemia	Bradycardia
Maternal drugs or substances (caffeine, nicotine, cocaine, methamphetamine)	Tachycardia, decrease in variability
Maternal supine hypotension	Late decelerations, bradycardia
Maternal pushing efforts	Variable decelerations prolonged decelerations, increase in baseline rate
Excessive uterine activity	Late decelerations, increase in baseline rate, decrease in variability
Oligohydramnios	Variable decelerations
Fetal anemia	Sinusoidal pattern, tachycardia
Fetal heart block	Bradycardia, decrease in variability
Fetal cardiac failure	Tachycardia, bradycardia, decrease in variability
Fetal heart structural defects	Bradycardia
Fetal tachyarrhythmia	Tachycardia, decrease in variability
Fetal viral infection (cytomegalovirus)	Bradycardia
Fetal congenital anomaly	Decrease in variability, decelerations
Pre-existing fetal neurologic abnormality	Decrease in variability, absent accelerations
Fetal autonomic response to changes in intracranial and/or cerebral blood flow caused by transient compression of the fetal head	Early decelerations
Transient disruption of oxygen transfer to the fetus resulting in transient hypoxemia	Late decelerations
Transient disruption of oxygen transfer from the environment to the fetus at the level of the umbilical cord	Variable decelerations
Disruption of oxygen transfer from the environment to the fetus at one or more points along the oxygen pathway	Prolonged decelerations

Derived from: Tucker, S. M., Miller, L. A., & Miller, D. A. (2009). *Fetal monitoring: A multidisciplinary approach.* St. Louis: Mosby, pages 99-125.[14]

GENERAL CONSIDERATIONS[3, 4, 6]

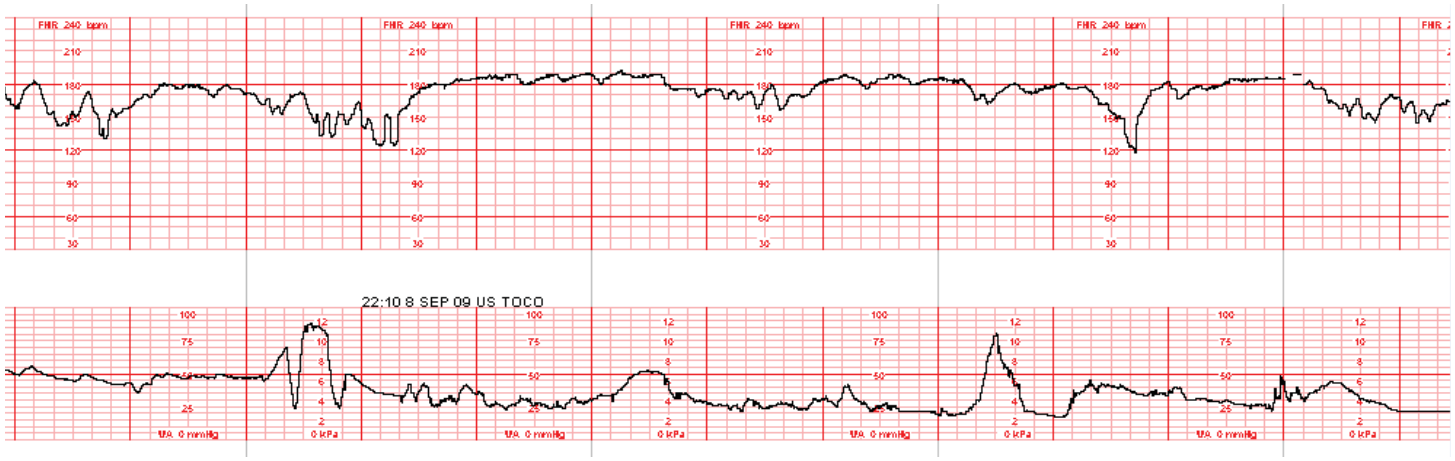
In consideration of the clinical applicability of electronic fetal monitoring and its efficacy, consistent scientific evidence supports the following:

- Electronic fetal monitoring has a high false positive rate for predicting adverse outcomes.
- With the use of electronic fetal monitoring, there is an increased rate of operative interventions: vacuum or forceps-assisted vaginal birth and cesarean birth.
- Electronic fetal monitoring is not useful in reducing the incidence of cerebral palsy.
- Amnioinfusion is useful in treating recurrent variable decelerations by relieving umbilical cord compression.

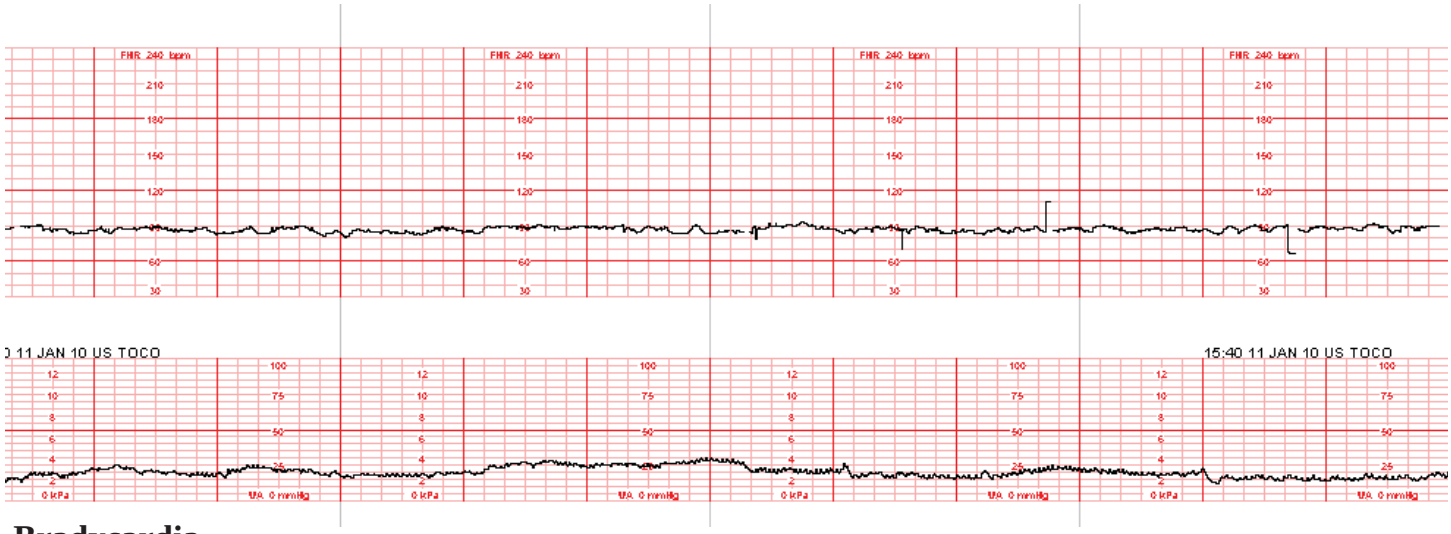
Conclusion

Electronic fetal monitoring can be useful in assessing fetal status during labor. While EFM has both limitations and benefits, it has the potential to be most helpful when all members of the perinatal team who are providing care to women in labor use standardized language in communicating data obtained from the fetal monitor. The value of a standardized set of definitions and classifications for fetal heart rate pattern interpretation and professional communication is that everyone is speaking and hearing the same language and is more likely to have the same understanding of fetal status based on the fetal heart rate pattern tracing. Expectations for intrauterine resuscitative measures and bedside evaluation by the primary care provider can be developed based on these standard definitions and classifications. Interdisciplinary case review using the EFM strip as a basis for discussion can be using in supporting ongoing education and teamwork. Standardization regarding communication of fetal data is one method to promote perinatal patient safety by minimizing risk of errors and avoiding miscommunication amongst members of the perinatal team during labor. This monograph focuses on the NICHD definitions and classifications as a way of sharing information.

Appendix A
Characteristics of Fetal Heart Rate Patterns

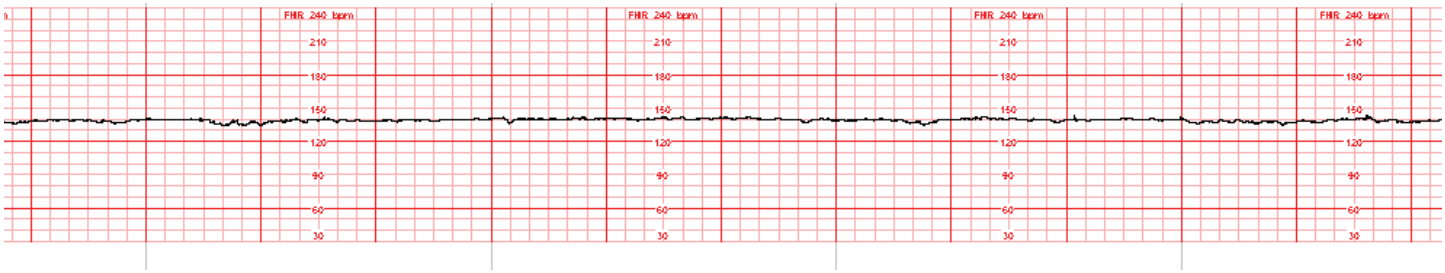


Tachycardia



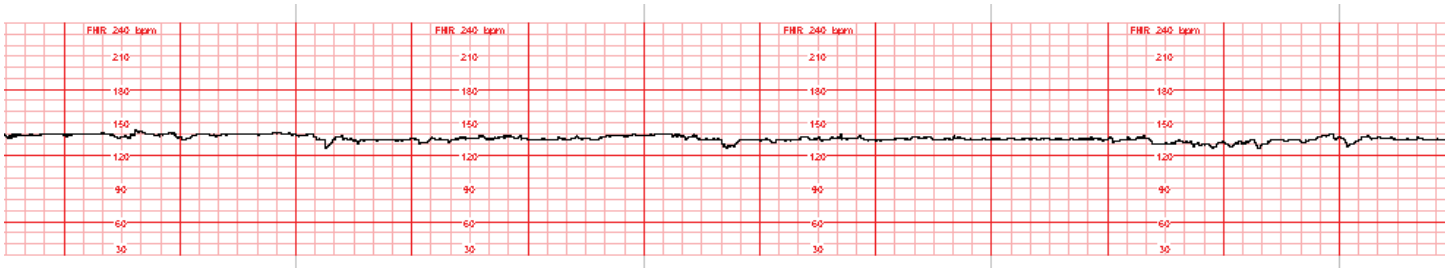
Bradycardia

Baseline Variability



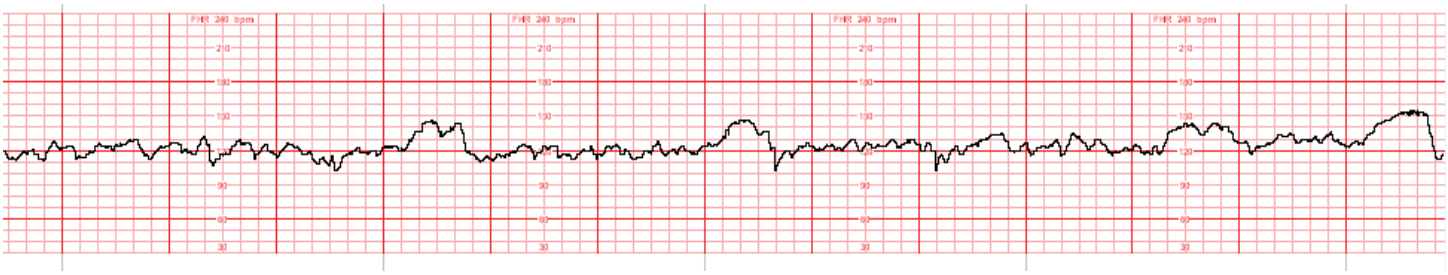
Absent

Undetectable from baseline



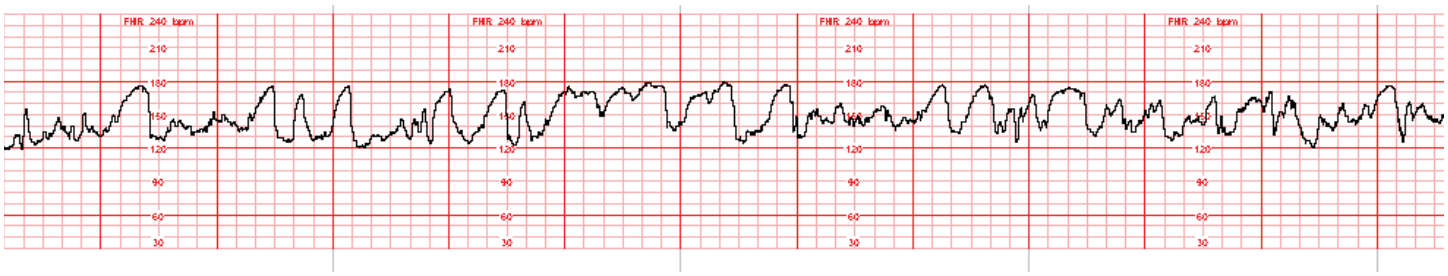
Minimal

Undetectable from baseline - ≤ 5 bpm



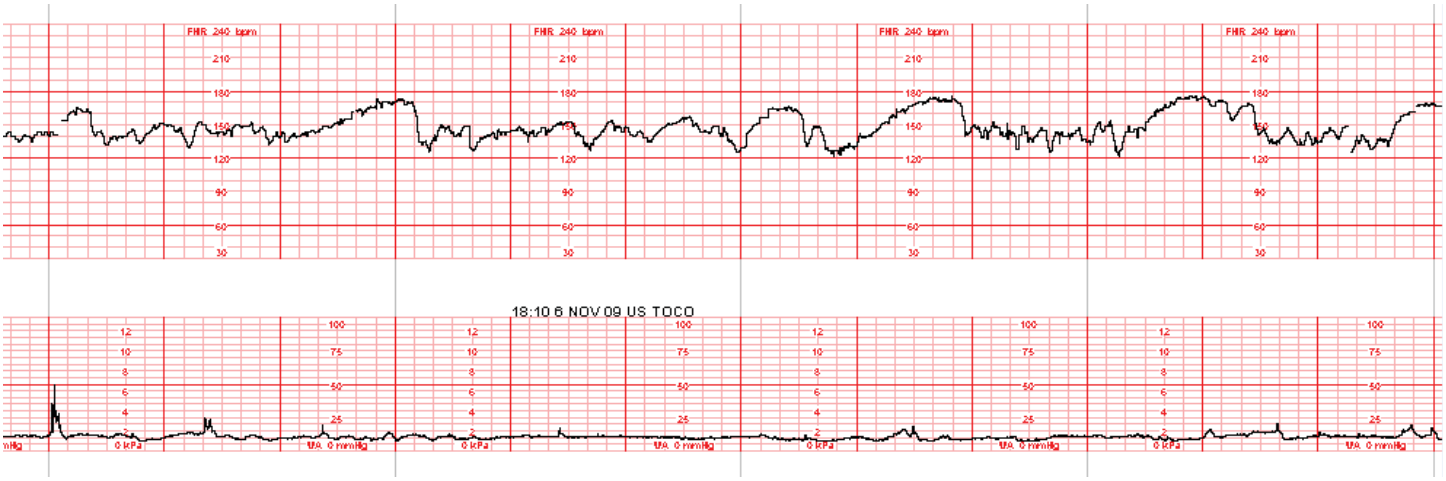
Moderate

6 – 25 bpm

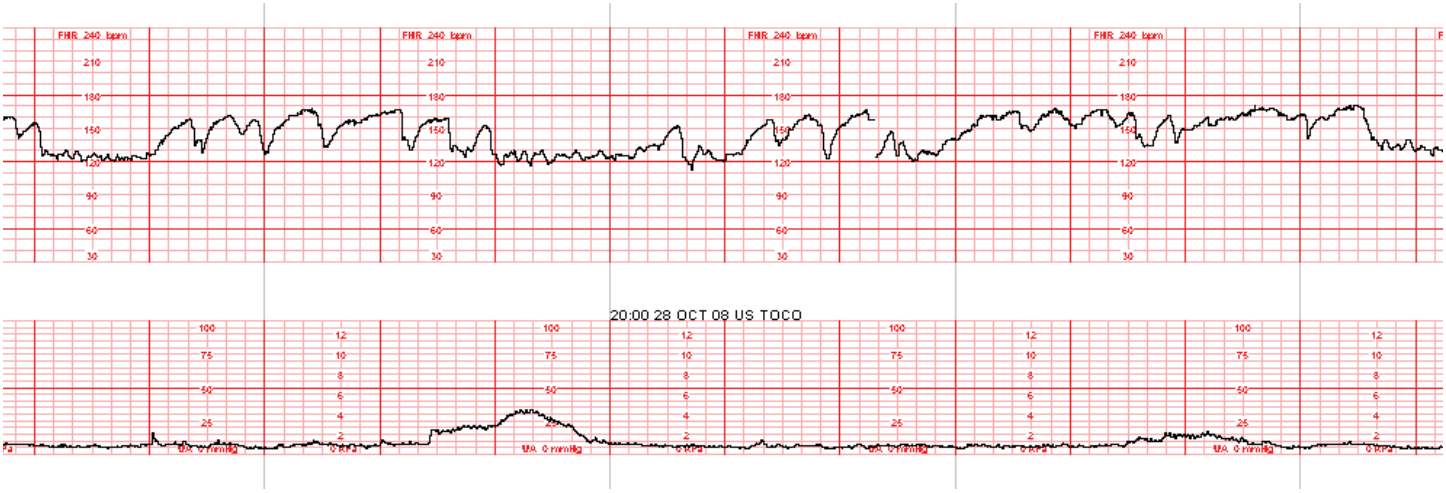


Marked

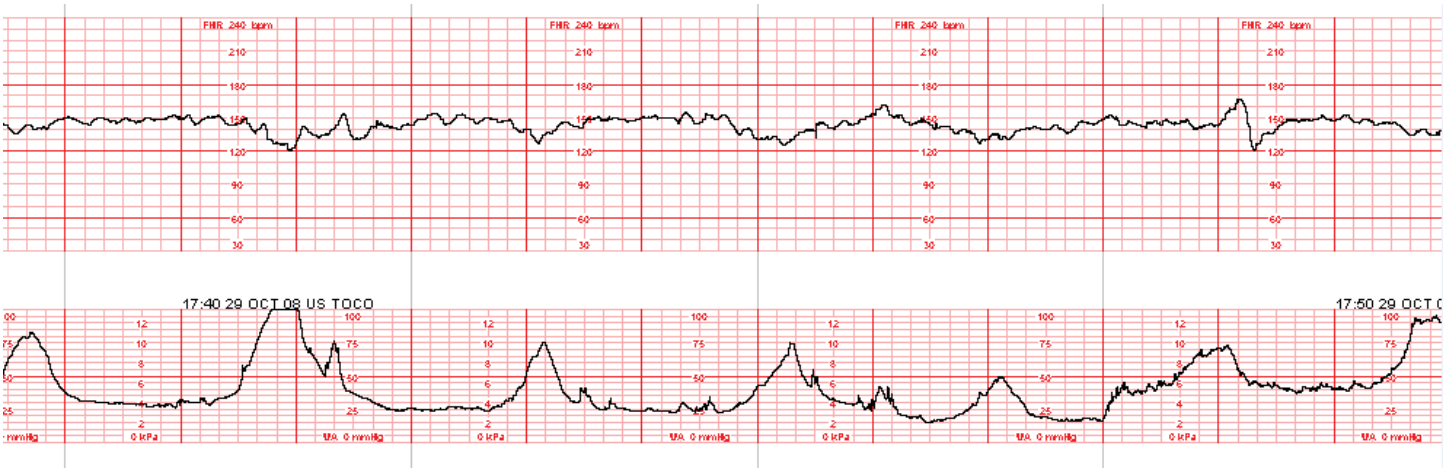
>25 bpm



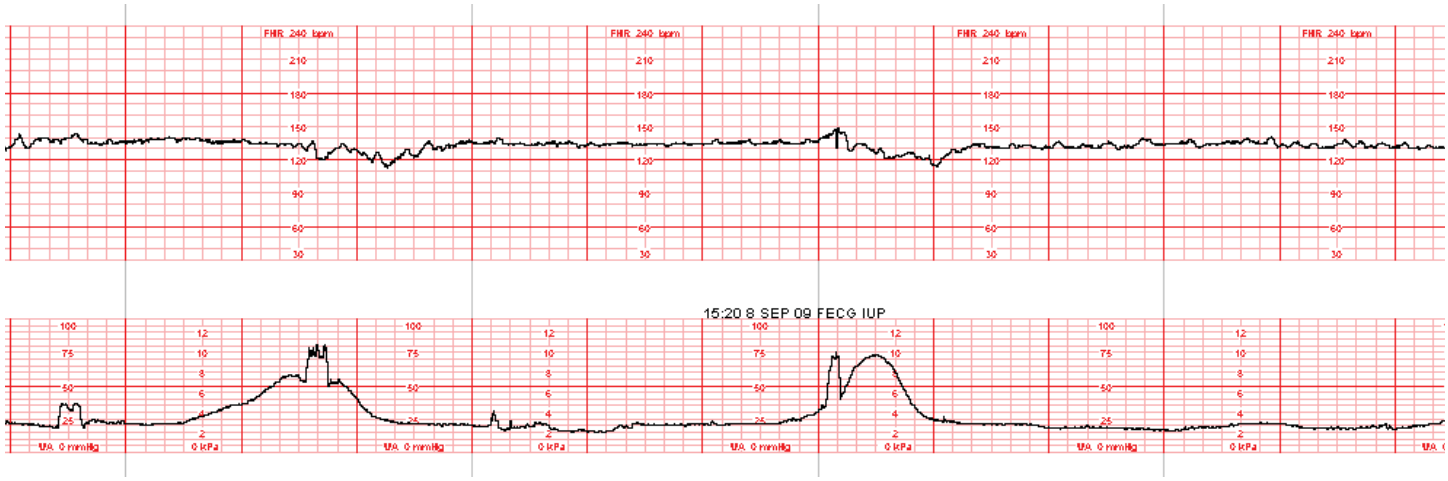
Accelerations



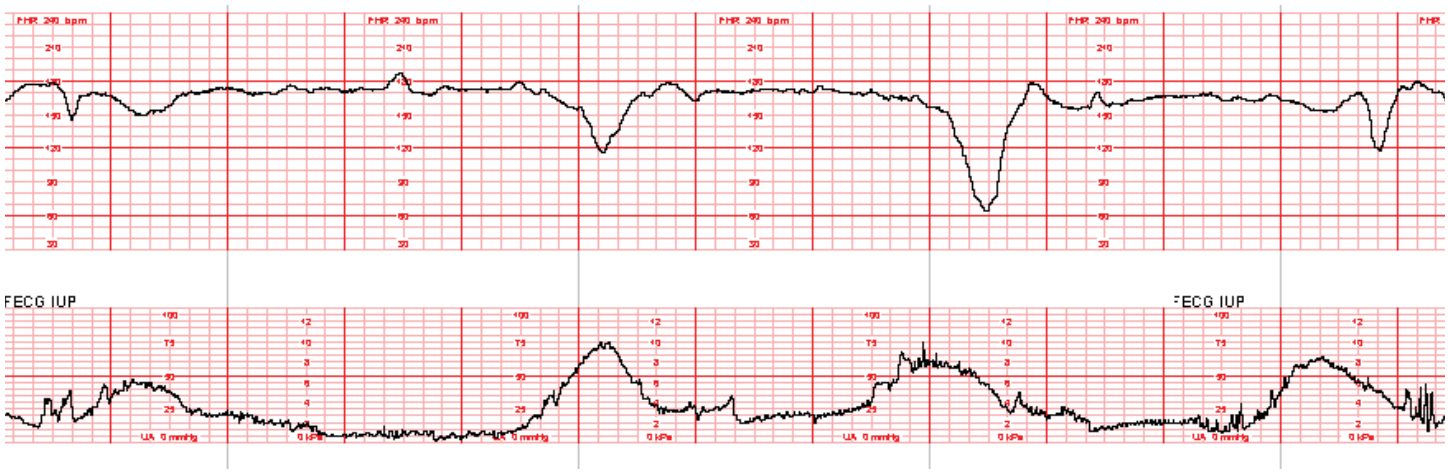
Prolonged Accelerations



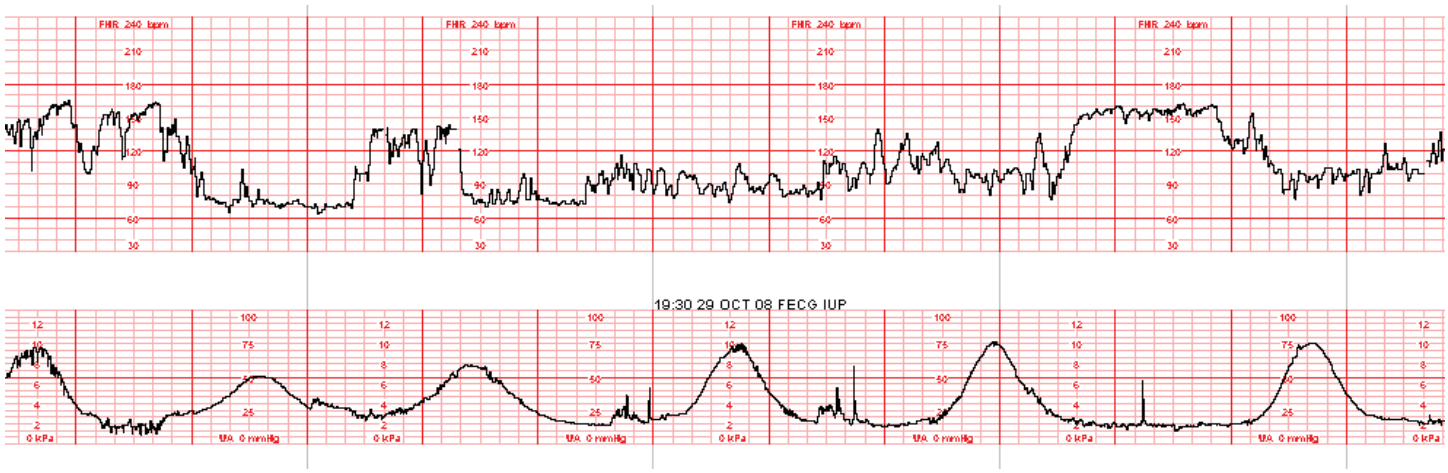
Early Decelerations



Late Decelerations

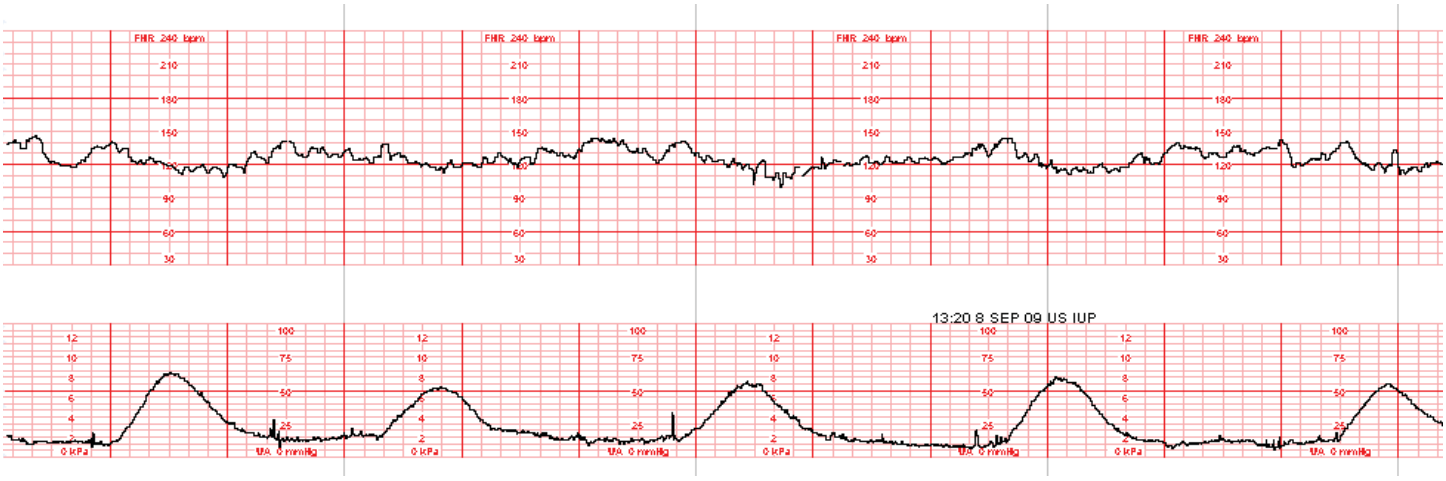


Variable Decelerations

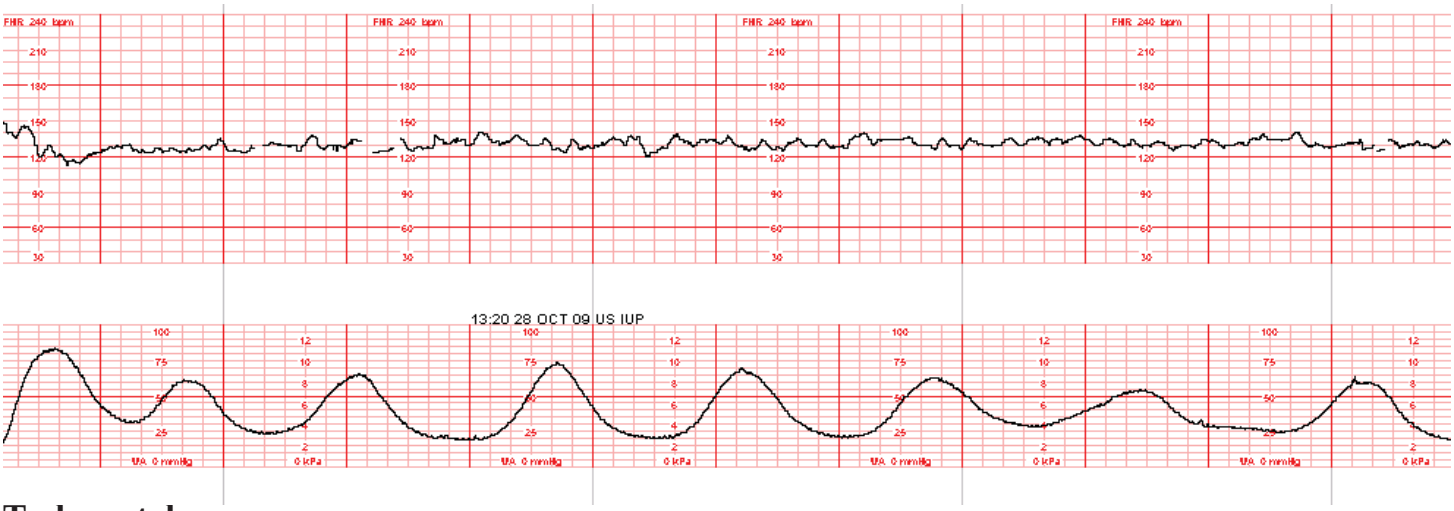


Prolonged Deceleration

Appendix B
Uterine Activity



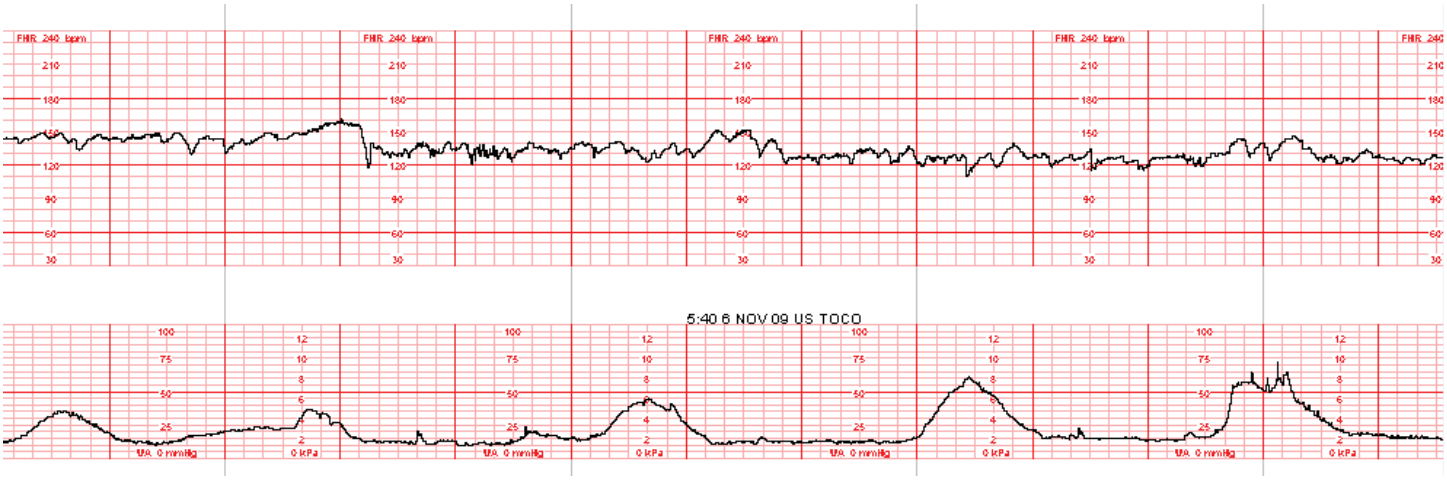
Normal Uterine Activity



Tachysystole

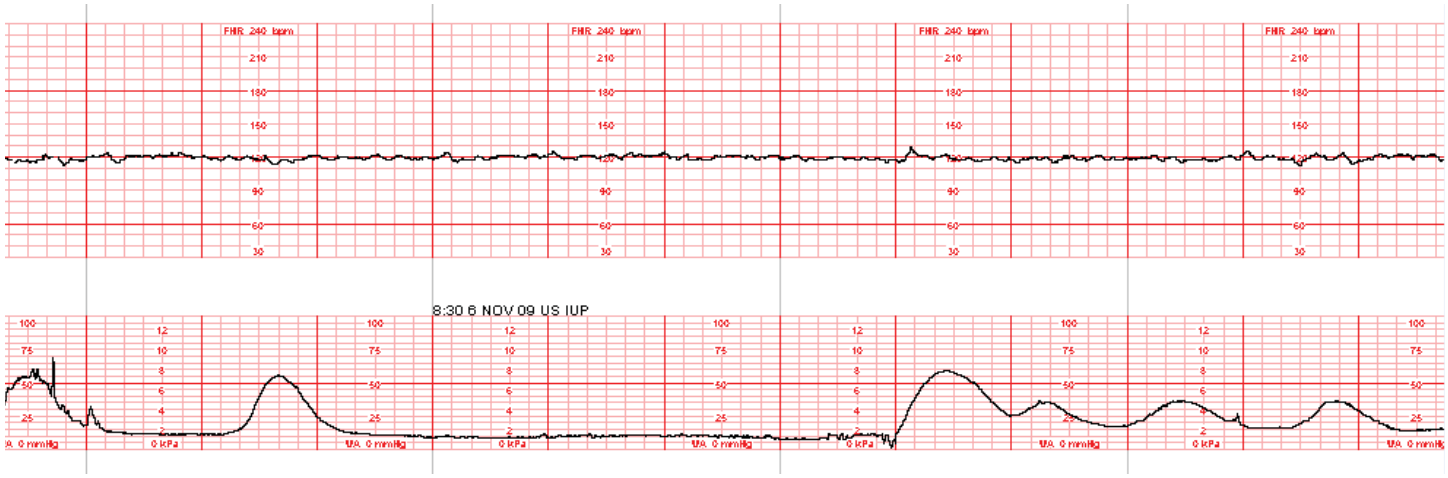
Appendix C
Categories of Fetal Heart Rate Tracings

Category I (Normal) Tracing

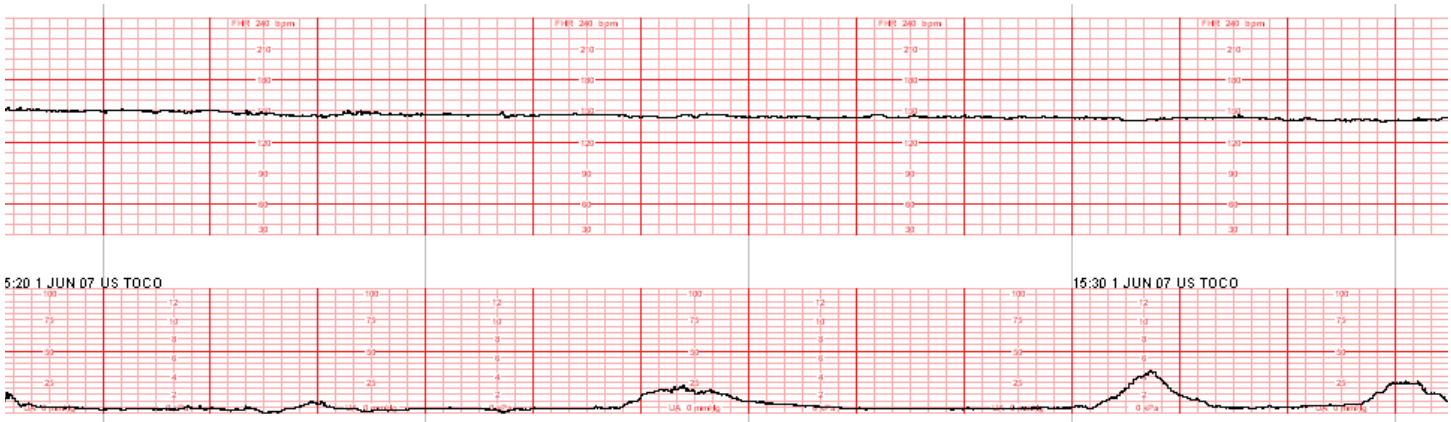


Criteria: Baseline rate 110 to 160 beats per minute; baseline variability moderate; late or variable decelerations absent; early decelerations present or absent

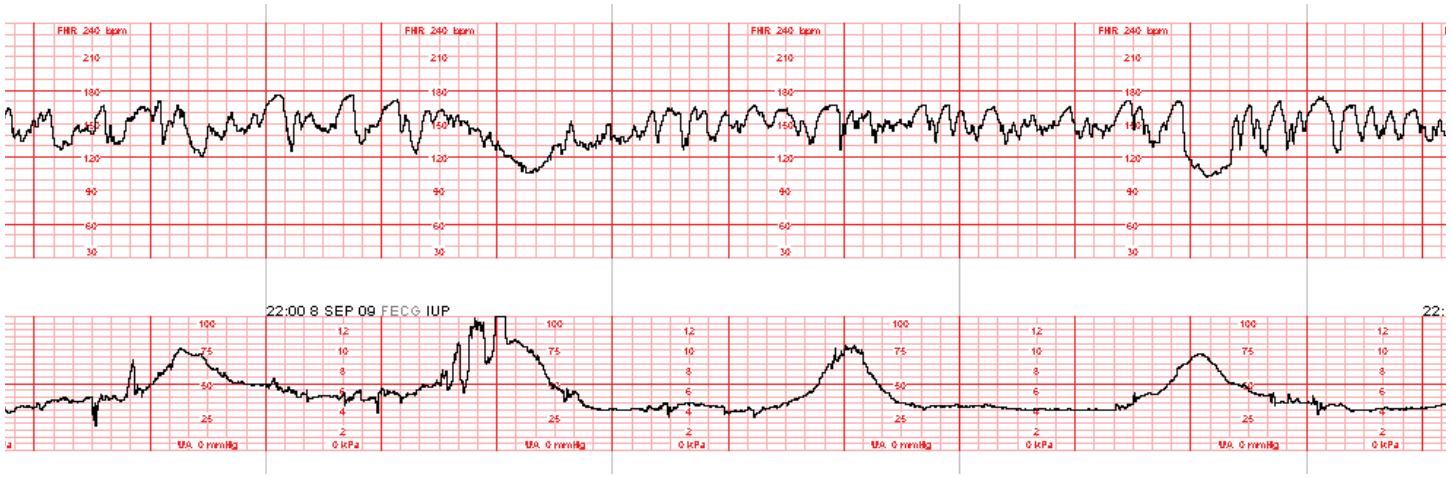
Category II (Indeterminate) Tracings



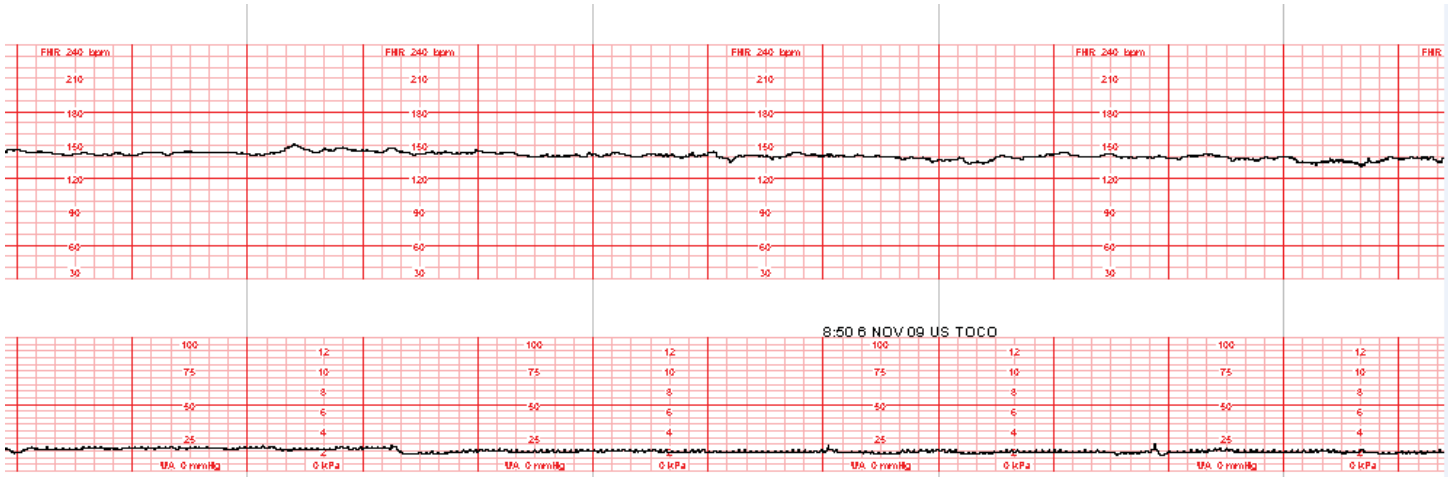
Criteria: Minimal variability



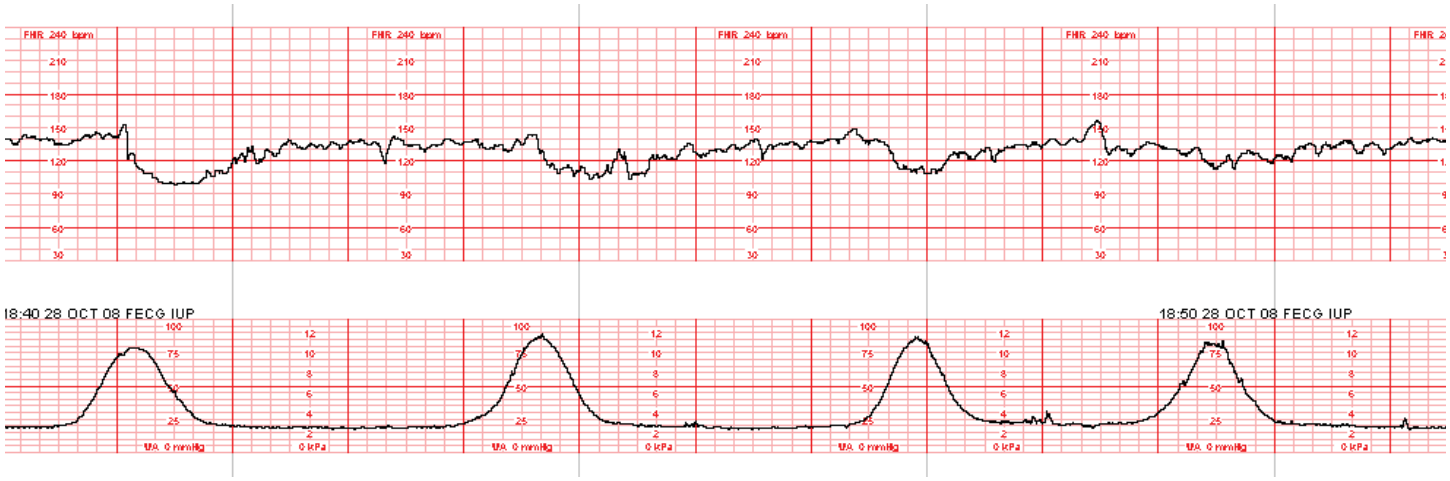
Criteria: Absent variability without recurrent decelerations



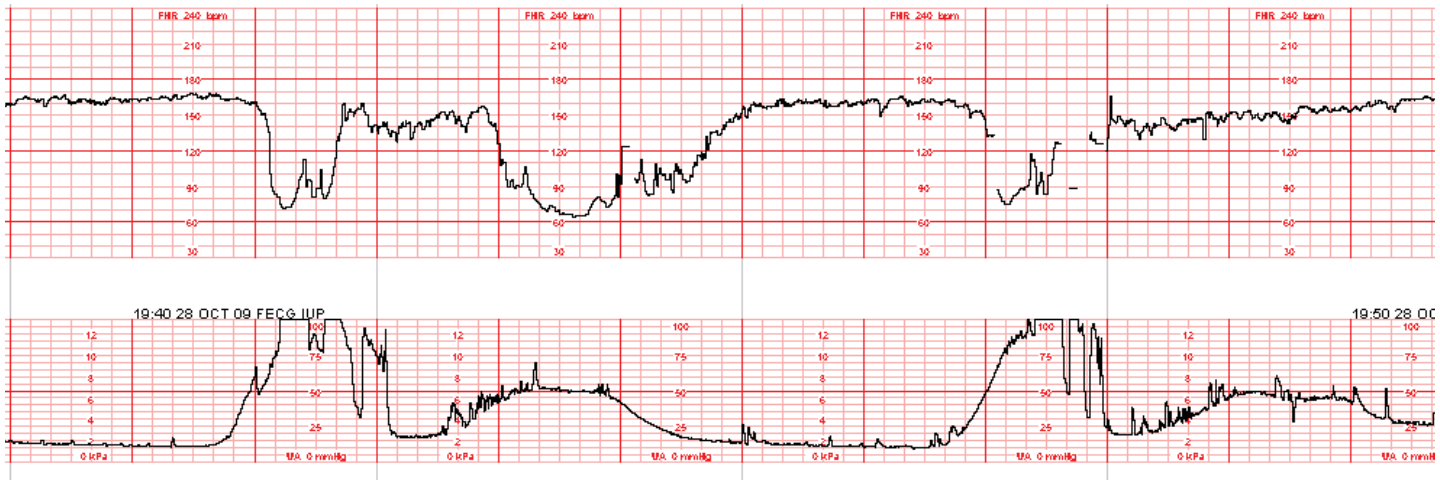
Criteria: Marked variability



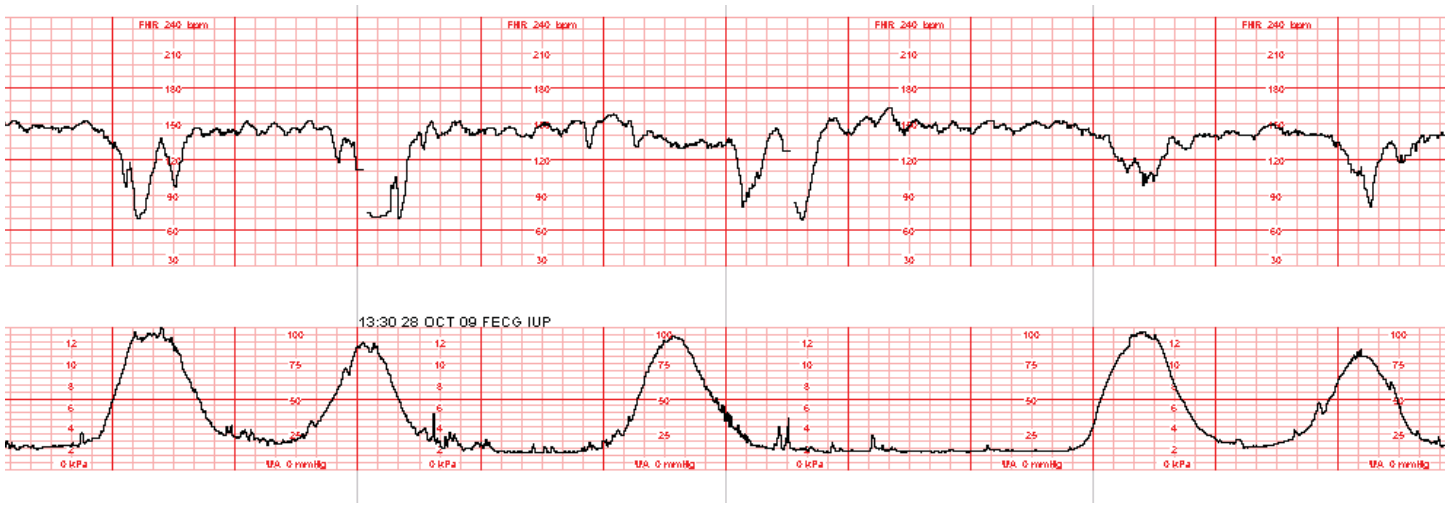
Criteria: Absence of induced accelerations after fetal stimulation



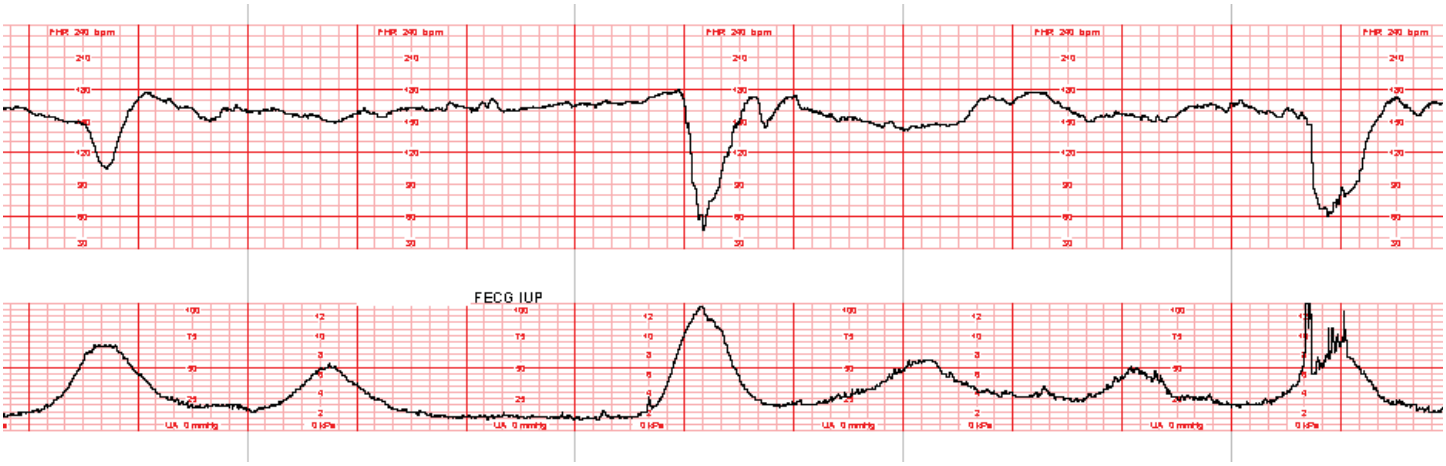
Criteria: Recurrent late decelerations with moderate variability



Prolonged deceleration

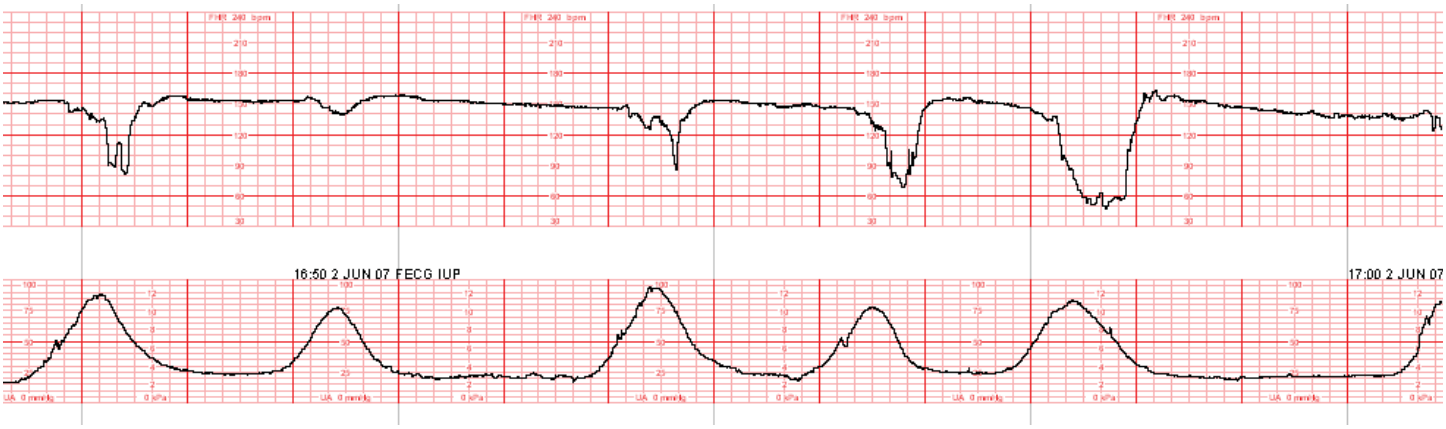


Criteria: Recurrent variable decelerations with moderate variability

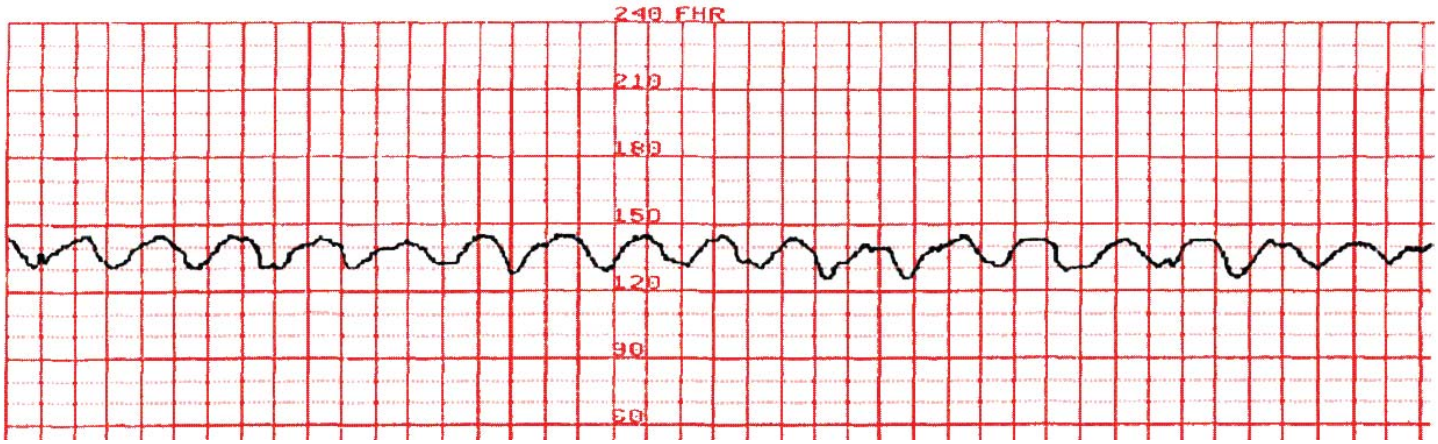


Criteria: Variable decelerations with “slow return to baseline”, “overshoots” or “shoulders”

Category III (Abnormal) Tracings



Absent variability and recurrent variable decelerations



Sinusoidal pattern

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